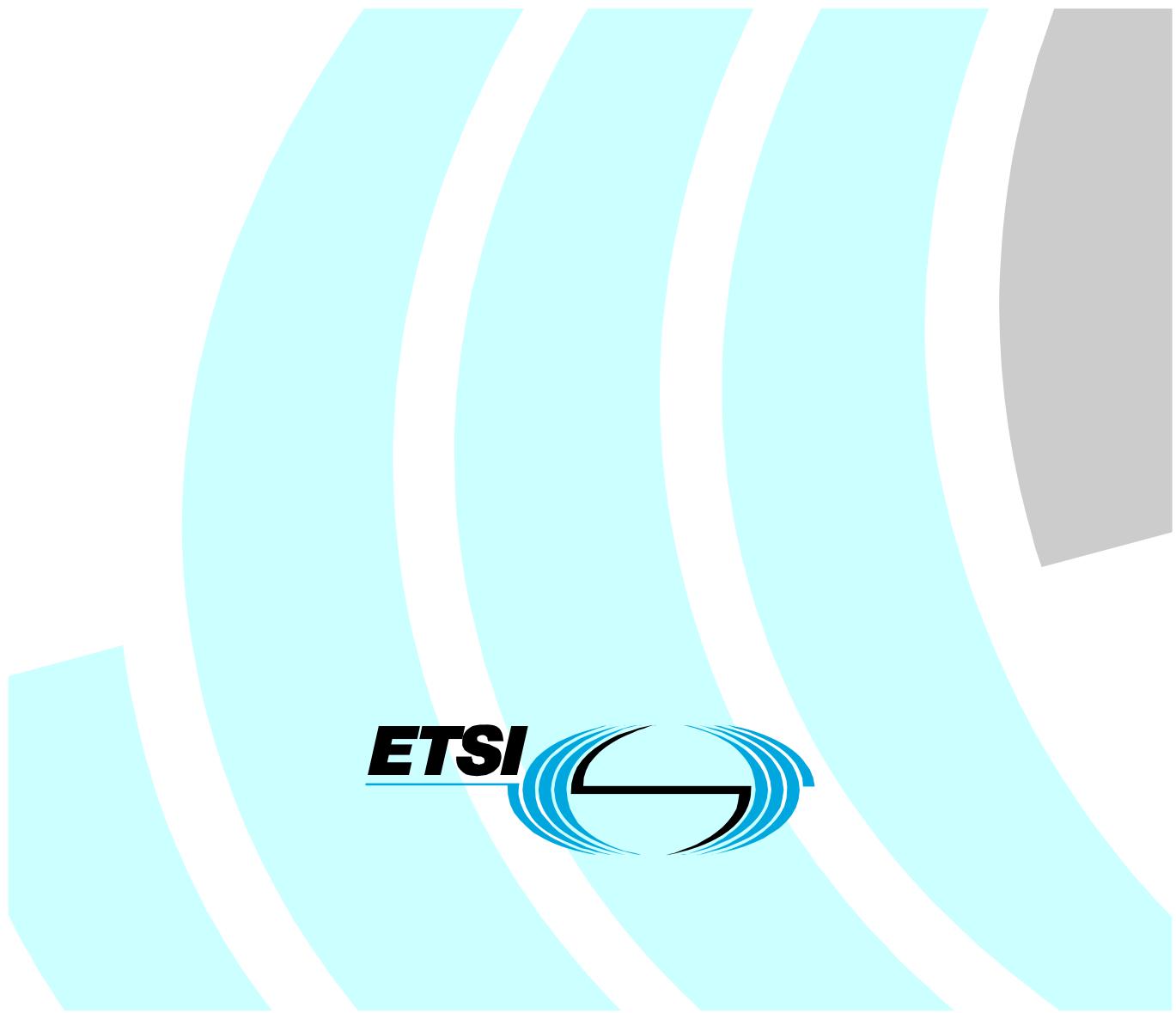


**Telecommunications and Internet converged Services and
Protocols for Advanced Networking (TISPAN);
Resource and Admission Control System (RACS);
Protocol Signalling flows specification;
RACS Stage 3**



Reference

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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

1 Scope

The scope for the present document is to specify normative rules for how to use the Gq', Rq and Ia protocols (TS 183 017 [4], ES 283 026 [3] and ES 283 018 [7]) as of TISPAN release 1. These rules apply to the interface between:

- P-CSCF and SPDF using Gq';
- IBCF and SPDF using Gq';
- SPDF and (C- and I-) BGF using Ia;
- SPDF and A-RACF using Rq.

In addition, to illustrate the usage of these rules, the present document contains informative signalling flows between the above-listed entities.

Non IMS AF entities are out of scope of the present document. Thus, the rules for using the Gq', Rq and Ia protocols and the signalling flows provided do NOT cover possible signalling scenarios for non-IMS applications. They describe however basic principles for how parameters travel via these protocols for IMS, which should be considered when using these protocols for non-IMS AF entities. In case of any discrepancy between the end-to-end IMS signalling flows in the present document and the ETSI TISPAN IMS specifications (TS 182 006 [5] and ES 283 003 [6]), the ETSI TISPAN IMS specification shall take precedence.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
 - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
 - for informative references.

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For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] IETF RFC 3550: "RTP: A Transport Protocol for Real-Time Applications".

- [2] ETSI TS 129 207: "Digital cellular telecommunications system (Phase 2+);Universal Mobile Telecommunications System (UMTS); Policy control over Go interface".
- [3] ETSI ES 283 026: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN);Resource and Admission Control; Protocol for QoS reservation information exchange between the Service Policy Decision Function (SPDF) and the Access-Resource and Admission Control Function (A-RACF) in the Resource and Protocol specification".
- [4] ETSI TS 183 017: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control: DIAMETER protocol for session based policy set-up information exchange between the Application Function (AF) and the Service Policy Decision Function (SPDF);Protocol specification ".
- [5] ETSI TS 182 006: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Stage 2 description (3GPP TS 23.228 v7.2.0, modified)".
- [6] ETSI ES 283 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3 [3GPP TS 24.229 [Release 7], modified]".
- [7] ETSI ES 283 018: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control: H.248 Profile for controlling Border Gateway Functions (BGF) in the Resource and Admission Control Subsystem (RACS); Protocol specification".
- [8] ETSI TS 124 229: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Not applicable.

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

A-RACF	Access - Resource Admission Control Function
AAA	AA-Answer
AAR	AA-Request
AF	Application Function
AVP	Attribute Value Pair
C/I-BGF	Core/Interconnection Border Gateway Function
CLF	Connectivity session Location and repository Function
IBCF	Interconnection Border Control Function
IMS	IP Multimedia Subsystem
IP	Internet Protocol
MG	Media Gateway
MGC	Media Gateway Controller
NAPT	Network Address and Port Translation
NAPT-PT	Network Address and Port Translation - Protocol Translation
PCMU	Pulse Code Modulation Mu-law
P-CSCF	Proxy - Call Session Control Function
RACS	Resource and Admission Control Subsystem
RTP	Real Time Protocol

RTCP	Real Time Control Protocol
SIP	Session Initiation Protocol
SPDF	Service-based Policy Decision Function
SDP	Session Description Protocol
UE	User Equipment
UL	Up Link
DL	Down Link
UDP	User Datagram Protocol

4 Example call flow (informative)

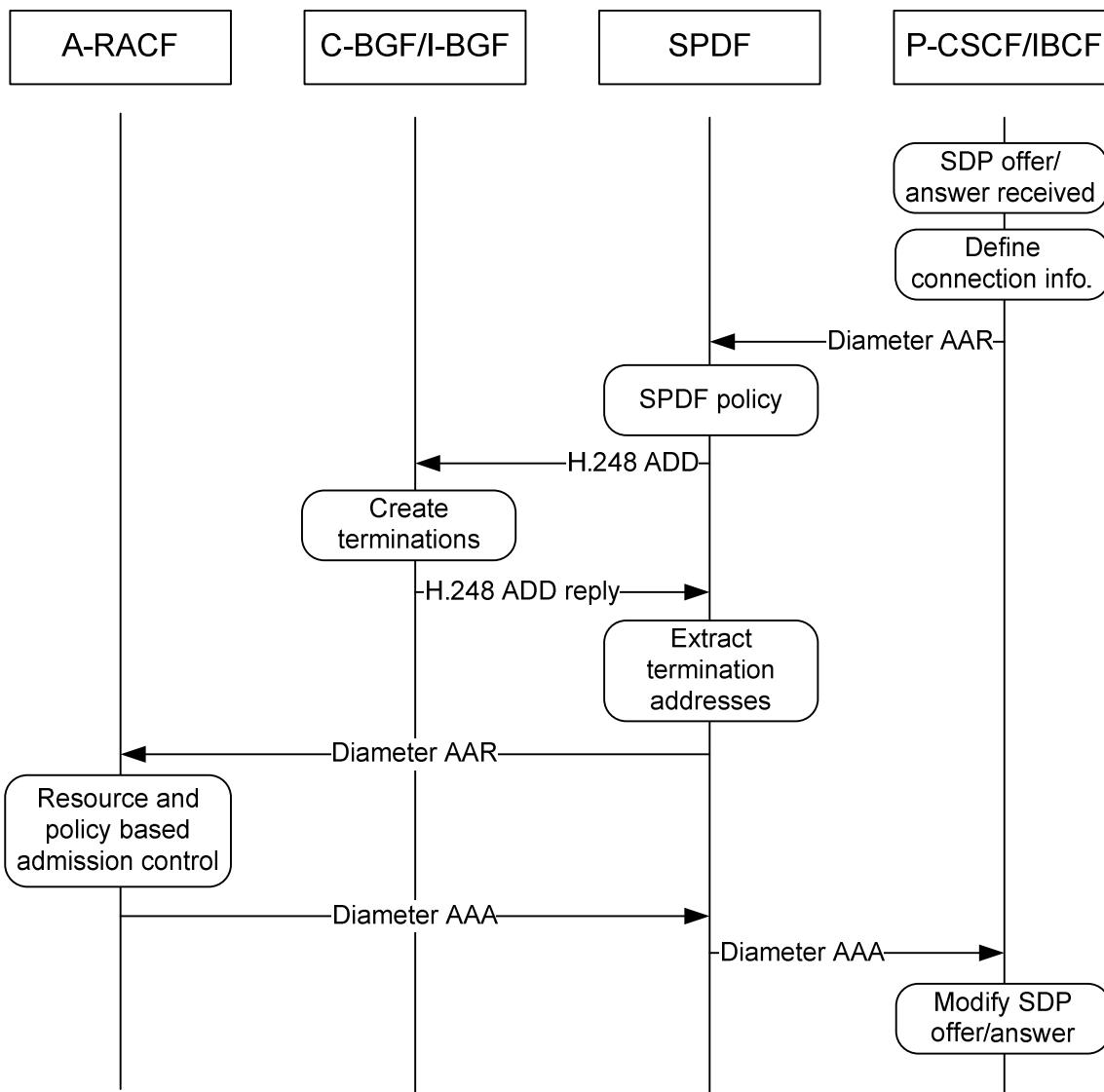


Figure 4.1: RACS, BGF and P-CSCF/IBCF interactions

Figure 4.1 illustrates the basic interactions involved when requesting a resource reservation from RACS for an IMS call. It should be noted that the SPDF may interrogate I/C-BGF and A-RACF in any order. Hence, interacting with the I/C-BGF before the A-RACF as shown in figure 4.1 is not mandated and the extraction of termination addresses done by the SPDF does not rely on any information coming from I/C-BGF. Instead this extraction is made from the Diameter AAR only. The interactions illustrated in figure 4.1 are repeated twice for each call setup and each SPDF instance along the path of the attempted call as described in the following clauses.

5 RACS related procedures (normative)

5.1 Procedures at P-CSCF/IBCF

5.1.1 Resource and admission control

This clause describes the rules used by the P-CSCF/IBCF to derive the bandwidth to request from RACS.

In case being present, the b= attribute will correspond to the bandwidth required by the most bandwidth demanding codec in the list. Hence, the Max-Requested-Bandwidth-UL and -DL shall be set to the value given by the b= attribute if present.

In case the b= attribute is not present the P-CSCF/IBCF shall set these AVPs according to one of the following rules:

- Set the AVPs to the value locally associated to the codec received in the m= line when only one codec is listed in the m= line or the highest bandwidth required by the codecs listed in the SDP offer (when multiple codecs are proposed for this media component).
- Set the AVPs to the value locally associated to the codec received in the m= line when only one codec is listed in the m= line or the lowest bandwidth required by the codecs listed in the SDP offer (when multiple codecs are proposed for this media component). In this case the Max-Requested-Bandwidth-UL and -DL AVPs may not reflect the actual bandwidth value that will be negotiated for the session.
- Omit the AVPs and let RACS determine a default bandwidth based on the combination of Reservation-Class and Media-Type AVPs.

The above-given rules are in line with the description given in annex B (table B.1) of TS 183 017 (Gq') [4] for how to populate the Max-Requested-Bandwidth-UL and -DL AVPs. These rules provide however more details on how to populate these AVPs referred to from TS 183 017 [4] in annex B (table B.1).

It should be noted that the above-given rules imply that the Max-Requested-Bandwidth-UL and -DL AVPs may be modified during the SDP negotiation (i.e. when the codec to be used is finally agreed between the endpoints).

5.1.2 NAPT/NAPT-PT at the P-CSCF/IBCF

Details on NAPT/NAPT-PT operations at the P-CSCF are given in TS 124 229 [8].

The IBCF supports controlled NAPT/NAPT-PT but does not support hosted NAPT/NAPT-PT traversal. That is, the IBCF is capable of replacing addresses and ports in the SDP as ephemeral terminations are created following the rules given in clauses 5.2.1.3 and 5.2.1.4, but the IBCF cannot handle address latching as used for hosted NAPT/NAPT-PT traversal. The P-CSCF is capable of both hosted NAPT/NAPT-PT traversal and controlled NAPT/NAPT-PT.

5.2 Procedures at SPDF

For resource and admission control purposes the SPDF will determine on local policy as specified in TS 183 017 [4] whether a C-BGF and/or an A-RACF need to be involved in the AF session.

5.2.1 Reservation with BGF involved

The SPDF procedures related to the Gq' interface involved in supporting NAPT/NAPT-PT services provided by the BGF and in supporting resource and admission control services provided by the A-RACF are described in TS 183 017 [4]. Based on these procedures this clause describes the operations of the SPDF involved in co-ordinating requests for these services made over Gq' with the required signalling over the Ia and Rq interfaces. The translation of values not specific to address translation received over Gq' to values used for request made over Ia is described in clause 5.2.1.1, operations involved in co-ordinating requests for NAPT/NAPT-PT services are described in clause 5.2.1.2, while the operations involved in co-ordinating resource and policy based admission control services are described in clause 5.2.1.3.

5.2.1.1 Resource reservation at the BGF

Upon reception of an initial reservation (SDP offer) the SPDF will extract from the information received with the AAR the important information in order to reserve resources at the transport layer, different AVPs will be received included in the AAR, only some of them will be retransmitted over the Ia interface. The aim of this clause is to provide the transcription for those AVPs:

- The Transport class AVP may be used for pointing to a class of transport services to be applied as detailed in TS 183 017 [4], in that way it may indicate the DSCP marking and the command syntax over the Ia interface may be ds/dscp, this information may be sent through the local control descriptor.
- The value of the Reservation priority AVP may be sent over the Ia interface as the priority of the context.

The following table summarizes the population rules for setting context and termination properties, based on received DIAMETER AVPs and local configuration data.

Table 5.2.1.1.1

Context parameters	Descriptor	Descriptor	Descriptor	Properties	Population rules
Context ID					Always set by the BGF
Priority Indicator					Set from the Reservation-Priority AVP
Emergency Indicator					Set from the Service Class AVP
	Term ID				See ES 283 018 [7]
	Media	Stream	Local Control		
				mode	Set from Flow-Status in Media-Component-Description and/or Flow-Status in Media-Component. Media-Sub-Component
				ds/dscp	Set from Transport-Class in Media-Component-Description.
				gm/saf	Depends on the Service-Class AVP and BGF profile information.
				gm/spf	Depends on the Service-Class AVP and BGF profile information.
				gm/sam	If gm/saf is set to ON, the gm/sam property is set from the Flow-Description in Media-Component. Media-Sub-Component.
				gm/spr	If gm/spf is set to ON, the gm/spr property is set from the Flow-Description in Media-Component. Media-Sub-Component.
				gm/rsb	Depends on the value of the Media-Type AVP and BGF profile information.
				gm/esas	Depends on the Service-Class AVP and whether NAP-PT is activated.
				gm/lsa	If gm/esas is set to ON, gm/lsa is set from the address (c= line) contained in the remote descriptor of the opposite termination.
				gm/esps	Depends on the Service-Class AVP and whether NAP-PT is activated.
				gm/lsp	If gm/esps is set to ON, gm/lsp is set from the port (m= line) contained in the remote descriptor of the opposite termination.
				tman/pdr	If the Transport-Class corresponds to constant bit rate traffic, the tman/pdr property shall be equivalent to the b= line of the local descriptor or absent. If the Transport-Class corresponds to variable bit rate traffic, the tman/pdr property shall be equivalent to the b= line of the local descriptor.
				tman/mbs	From Reservation-Class AVP
				tman/dvt	From Reservation-Class AVP
				tman/sdr	If the Transport-Class corresponds to constant bit rate traffic, this property shall be omitted or identical to tman/pdr. If the Transport-Class corresponds to variable bit rate traffic this property shall be derived from tman/pdr using rules specific to the transport class.
				tman/pol	Set from the Transport-Class AVP.
		Local			c= If NAPT-PT is activated, the address shall be assigned by the BGF. Otherwise the address is set from the contents of the remote descriptor of the opposite termination. See ES 283 018 [7] for the setting of other fields of the c= line.

Context parameters	Descriptor	Descriptor	Descriptor	Properties	Population rules
					<p>m=</p> <p>If NAPT-PT is activated, the port shall be assigned by the BGF. Otherwise the port is set from the contents of the remote descriptor of the opposite termination.</p> <p>See ES 283 018 [7] for the setting of other fields of the m= line.</p> <p>b=</p> <p>Shall be set from the Max-Requested-Bandwidth-UL or Max-Requested-Bandwidth-DL depending on the termination (upstream or downstream). (see note)</p>
		Remote			<p>c=</p> <p>The address is set from the Flow-Description in Media-Component. Media-Sub-Component.</p> <p>See ES 283 018 [7] for the setting of other fields of the c= line.</p> <p>m=</p> <p>The port is set from the Flow-Description in Media-Component. Media-Sub-Component.</p> <p>See ES 283 018 [7] for the setting of other fields of the m= line.</p> <p>b=</p> <p>Shall be set from the Max-Requested-Bandwidth-UL or Max-Requested-Bandwidth-DL depending on the termination (upstream or downstream). (see note)</p>
NOTE: If gm/rsb is set to ON, the value of the AVPs associated to the RTCP flow shall be added.					

5.2.1.2 Specific Actions at the BGF

See Ia-to-Gq' mapping guidelines in ES 283 018 [7], annex E.

NOTE: The present document has TISPAN Release 1 in scope, whereas the referred ES 283 018 [7] provides the H.248 Ia profile version 2 for TISPAN Release 2. This is considered not to be an issue because the present document is not yet providing signalling flow examples with the Specific Action AVPs.

5.2.1.3 Initial reservation for an session (SDP offer)

Upon reception of an initial AAR with connection information, the SPDF shall extract the connection information from the Media-Component-Description AVP(s).

Each Media-Component-Descriptor AVP received (one per m= line or media stream) contains one or more Media-Sub-Component AVP(s) carrying a set of Flow-Descriptor AVP(s) that describe a unidirectional IP flow associated with the media stream.

The SPDF shall from the set of Flow-Descriptor AVP(s) identify the direction of the corresponding IP flows i.e. uplink or downlink. The direction of each IP flow is given by the value of the direction attribute of the corresponding Flow-description AVP (i.e. "in" for uplink IP flows, and "out" for downlink IP flows). For each potential requesting application that requires the services of a BGF, the SPDF shall hold a local mapping table that enables SPDF to ensure, that both ephemeral terminations created for the session in the BGF are configured with connection information that matches appropriately the IP flow direction with the network interface connecting the ephemeral termination.

In the P-CSCF case, an uplink IP flow originates from the UE served by the P-CSCF, and a downlink IP flow is directed towards the UE served by the P-CSCF.

In the IBCF case, an uplink IP flow is directed from the local core network towards the peer core network, and a downlink IP flow is directed from the peer core network towards the local core network.

The Binding-Input-List AVP shall be populated with an even number of V4-Transport-Address AVP or V6-Transport-Address list elements. The first list element in each pair of list elements applies to the access side and the second element applies to the core side. In case one of the V4-Transport-Address AVP or V6-Transport-Address AVP in such pair is unknown, an even number of list elements shall be still provided with the unknown V4-Transport-Address AVP or V6-Transport-Address AVP wild-carded.

The above-given rules apply to the P-CSCF but are also valid for the IBCF provided that "access side" is replaced by "local core side" and "core side" by "peer core side". It shall be one pair of V4-Transport-Address AVP or V6-Transport-Address list elements in the Binding-Input-List AVP for each single Media-Component-Description AVP in an AAR. The list of such pairs shall be given in the same order as the list of Media-Component-Description AVPs. This provides an explicit coupling between each Media-Component-Description AVP, each pair of list elements in the Binding-Input-List AVP, and each pair of terminations in the BGF.

The following description for how to create ephemeral terminations applies to the P-CSCF but is also valid for the IBCF provided that "access network" is replaced by "local core network" and "core network" by "peer core network".

After selection of the BGF to be contacted for the session, the SPDF requests initial configuration of the BGF to create a context with two ephemeral terminations:

- ephemeral termination TA connecting the access network to the BGF; and
- ephemeral termination TC connecting the core network to the BGF.

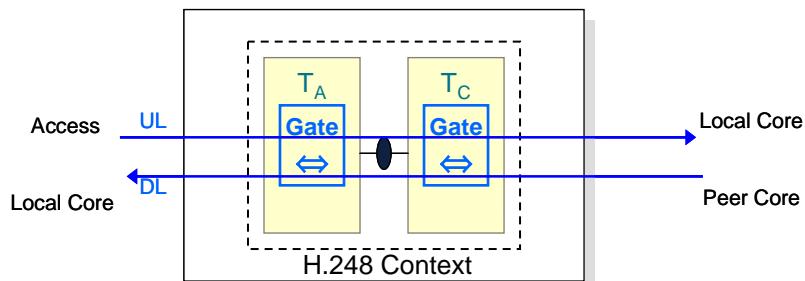


Figure 5.2.1.3.1: BGF connection and flow model representation

For connection information corresponding to a downlink IP flow, the SPDF shall:

- on termination TA,
 - define one media stream per Media-Component-Description AVP occurrence (see note 1),
 - for each media stream,
 - set the remote Descriptor to the corresponding destination IP and port address of the Flow-Description AVP marked with "out" direction and contained in the Media-Sub-Component AVP for which the Flow-Usage AVP is either absent or set to "no_information".
- on termination TC,
 - define one media stream per Media-Component-Description AVP occurrence (see note 1),
 - for each media stream,
 - if destination address NAPT(-PT) is activated for DL IP flows, request the BGF to select an IP and port address in the local Descriptor and store the selected value;
 - otherwise i.e. if destination address NAPT(-PT) is not activated for DL IP flows, set the local Descriptor to the value assigned to the remote Descriptor of termination TA;
 - optionally, configure the local control Descriptor with the gm/lsa and gm/lsp set to the value assigned to the remote Descriptor of termination TA (see note 2).

For connection information corresponding to an uplink IP flow, the SPDF shall:

- on termination TC,
 - define one media stream per Media-Component-Description AVP occurrence (see note 1),
 - for each media stream,
 - set the remote Descriptor to the corresponding destination IP and port address of the Flow-Description AVP marked with "in" direction and contained in the Media-Sub-Component AVP for which the Flow-Usage AVP is either absent or set to "no_information".
- on termination TA,
 - define one media stream per Media-Component-Description AVP occurrence (see note 1),
 - for each media stream,
 - if destination address NAPT(-PT) is activated for UL IP flows, request the BGF to select an IP and port address in the local Descriptor and store the selected value;
 - otherwise i.e. if destination address NAPT(-PT) is not activated for UL IP flows, set the local Descriptor to the value assigned to the remote Descriptor of termination TC;
 - Optionally, configure the local control Descriptor with the gm/lSa and gm/lSp properties set to the value assigned to the Remote Descriptor of termination TC (see note 3).

NOTE 1: The SPDF can also specify additional media stream for RTCP this is described in ES 283 018 [7].

NOTE 2: This ensures that UL IP flows will be sent towards the core network using a source IP and port address identical to the address used by the UE for sending packets, assuming that the UE sends and receives packets using the same address and port.

NOTE 3: This ensures that DL IP flows will be sent towards the access network using a source IP and port address identical to the address used by the peer for sending packets, assuming that the peer sends and receives packets using the same address and port.

If destination address NAPT(-PT) is activated for UL and/or DL IP flows, the SPDF shall return in the AAA message the list of IP and port address(es) selected by the BGF as local Descriptors in the Binding-Output-List AVP for each media stream in the same order as the corresponding Binding-Input-List AVP of the AAR message.

5.2.1.4 Connection information received from the opposite direction (SDP answer)

Upon reception of a subsequent AAR with connection information, the SPDF shall extract the connection information from the Media-Component-Description AVP(s). These operations are performed as described in the previous clause.

The rules for how to populate the Binding-Input-List AVP and its relation to Media-Component-Description AVPs given in clause 5.2.1.3 apply also to this clause.

The following description for how to create ephemeral terminations applies to the P-CSCF but is also valid for the IBCF provided that "access network" is replaced by "local core network" and "core network" by "peer core network".

After selection of the BGF to be contacted for the session, the SPDF requests subsequent configuration of the context created within the BGF.

For connection information corresponding to a downlink IP flow, SPDF shall:

- modify termination TA,
 - for each media stream,
 - set the remote Descriptor to the corresponding destination IP and port address of the Flow-Description AVP marked with "out" direction and contained in the Media-Sub-Component AVP for which the Flow-Usage AVP is either absent or set to "no_information".

- modify termination TC,
 - for each media stream,
 - if destination address NAPT(-PT) is activated for DL IP flows, request the BGF to select an IP and port address in the local Descriptor and store the selected value;
 - otherwise i.e. if destination address NAPT(-PT) is not activated for DL IP flows, set the local Descriptor to the value assigned to the remote Descriptor of termination TA;
 - Optionally, configure the local control Descriptor with the gm/lsa and gm/lsp properties set to the value assigned to the Remote Descriptor of termination TA (see note 2).

For connection information corresponding to an uplink IP flow, the SPDF shall:

- modify termination TC,
 - for each media stream,
 - set the remote Descriptor to the corresponding destination IP and port address of the Flow-Description AVP marked with "in" direction and contained in the Media-Sub-Component AVP for which the Flow-Usage AVP is either absent or set to "no_information".
- modify termination TA,
 - for each media stream,
 - if destination address NAPT(-PT) is activated for UL IP flows, request the BGF to select an IP and port address in the local Descriptor and store the selected value;
 - otherwise i.e. if destination address NAPT(-PT) is not activated for UL IP flows, set the local Descriptor to the value assigned to the remote Descriptor of termination TC;
 - Optionally, configure the local control Descriptor with the gm/lsa and gm/lsp set to the value assigned to the remote Descriptor of termination TC (see note 1).

NOTE 1: This ensures that DL IP flows will be sent towards the access network using a source IP and port address identical to the address used by the peer for sending packets, assuming that the peer sends and receives packets using the same address and port.

NOTE 2: This ensures that UL IP flows will be sent towards the core network using a source IP and port address identical to the address used by the UE for sending packets, assuming that the UE sends and receives packets using the same address and port.

If destination address NAPT(-PT) is activated for UL and/or DL IP flows, the SPDF shall return in the AAA message the list of IP and port address(es) selected by the BGF as local Descriptors in the Binding-Output-List AVP for each media stream in the same order as the corresponding Binding-Input-List AVP of the AAR message.

5.2.1.5 Connection information (SDP answer) received corresponding to multiple early dialogues

The SPDF may receive more than one AAR with SDP answer connection info in case the AF identifies that multiple early dialogues are being created. These AAR will be marked with a SIP-Forking-Indication AVP set to value SEVERAL_DIALOGUES. The SPDF shall request resources from the BGF as if this was an AAR (SDP answer) without Forking-Indication but shall be prepared to restore QoS requirements for one of the early dialogues. The final dialogue is identified when an AAR (SDP answer) is received without the SIP-Forking-Indication AVP.

5.2.2 Reservation involving both A-RACF and BGF

The signalling flow when both the A-RACF and BGF are involved is a combination of the procedures for accessing the BGF specified in clauses 5.2.1 and the procedures for accessing the A-RACF specified in ES 283 026 [3].

The sequence used by the SPDF to access A-RACF and BGF is a local decision in the SPDF, e.g. the SPDF is able to decide whether to access the A-RACF and then the BGF, or vice versa, or both in parallel. This is valid for request, modification and release.

6 Example signalling flows (informative)

The examples of stage 3 signalling flows for TISPAN NGN release 1 provided by the present document cover signalling between P-CSCF and SPDF using Gq', IBCF and SPDF using Gq', SPDF and (C- and I-) BGF using Ia, and SPDF and A-RACF using Rq. The examples all build on a basic IMS end-to-end signalling flow between two SIP end-points (Phone A and Phone B in clauses 6.1.1 and 6.2.1). The signalling flow without IBCF operations (figure 6.1.1) is described in clause 6.1 and involves at the IMS level two P-CSCF entities and one S-CSCF entity. The involvement of IBCF entities at the IMS level is based on the same signalling flow but with two S-CSCF entities and two IBCF entities (figure 6.2.1). The specific interactions involving IBCF entities are described in clause 6.2.

6.1 Basic IMS end-to-end signalling flow

Figure 6.1.1 illustrates the example network architecture.

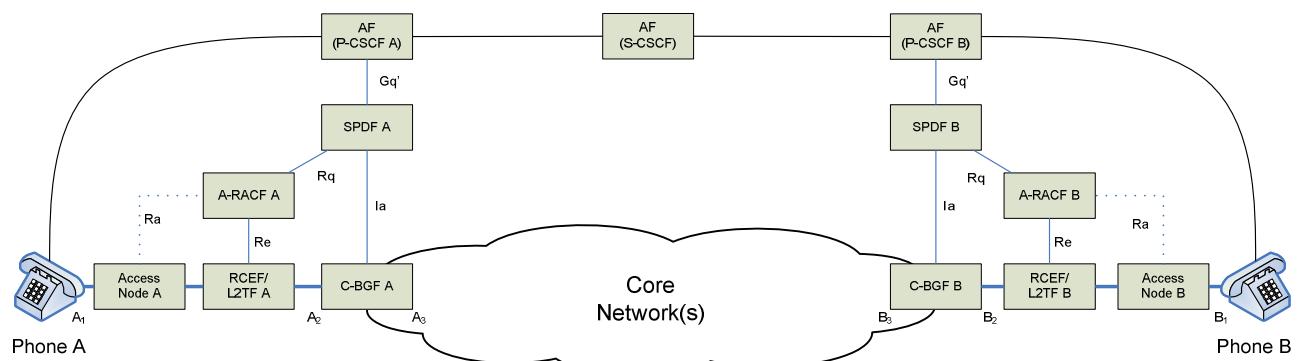


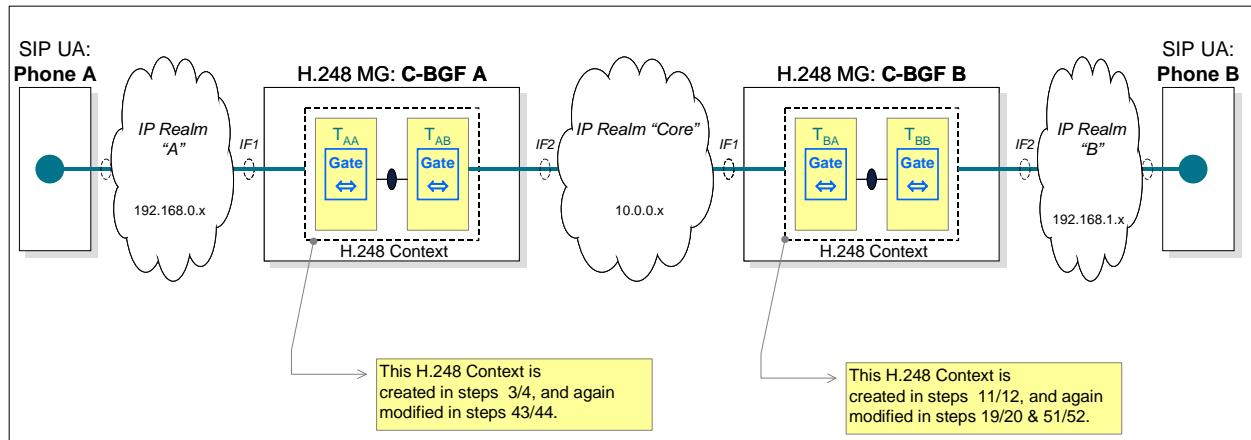
Figure 6.1.1: IMS end-to-end signalling flow between two SIP end-points - without IBGF

As indicated in [1] RTP should use an even destination port number and the corresponding RTCP stream should use the next higher (odd) destination port number. Following these recommendations the addresses and ports used in the example are as follows:

- $A_1 = 192.168.0.2:23942$ for RTP and $192.168.0.2:23943$ for RTCP.
- $A_2 = 192.168.0.1:4444$ for RTP and $192.168.0.1:4445$ for RTCP.
- $A_3 = 10.0.0.1:2222$ for RTP and $10.0.0.1:2223$ for RTCP.
- $B_1 = 192.168.1.2:29792$ for RTP and $192.168.1.2:29793$ for RTCP.
- $B_2 = 192.168.1.1:3332$ for RTP and $192.168.1.1:3333$ for RTCP.
- $B_3 = 10.0.0.2:1110$ for RTP and $10.0.0.2:1111$ for RTCP.

The RTP stream is assumed to consume 96 kbps, while the RTCP is assumed to use 8 kbps. No packet loss occurs. The statistics are approximately chosen in the message flows. Identifiers used in the examples are selected to follow the formats defined for the respective protocols.

Figure 6.1.2 focuses on the two C-BGF entities, which are H.248-controlled MG entities, and highlights the "BGF Connection Model", which relates to single H.248 Contexts with each two H.248 IP terminations. It has to be noted that figure 6.1.2 is just an example, indicating only the single H.248 Stream solution for RTP and RTCP together.



NOTE: The picture highlights the BGF Connection models.

Figure 6.1.2: Simplified network model with focus on BGF entities only

6.1.1 Session setup

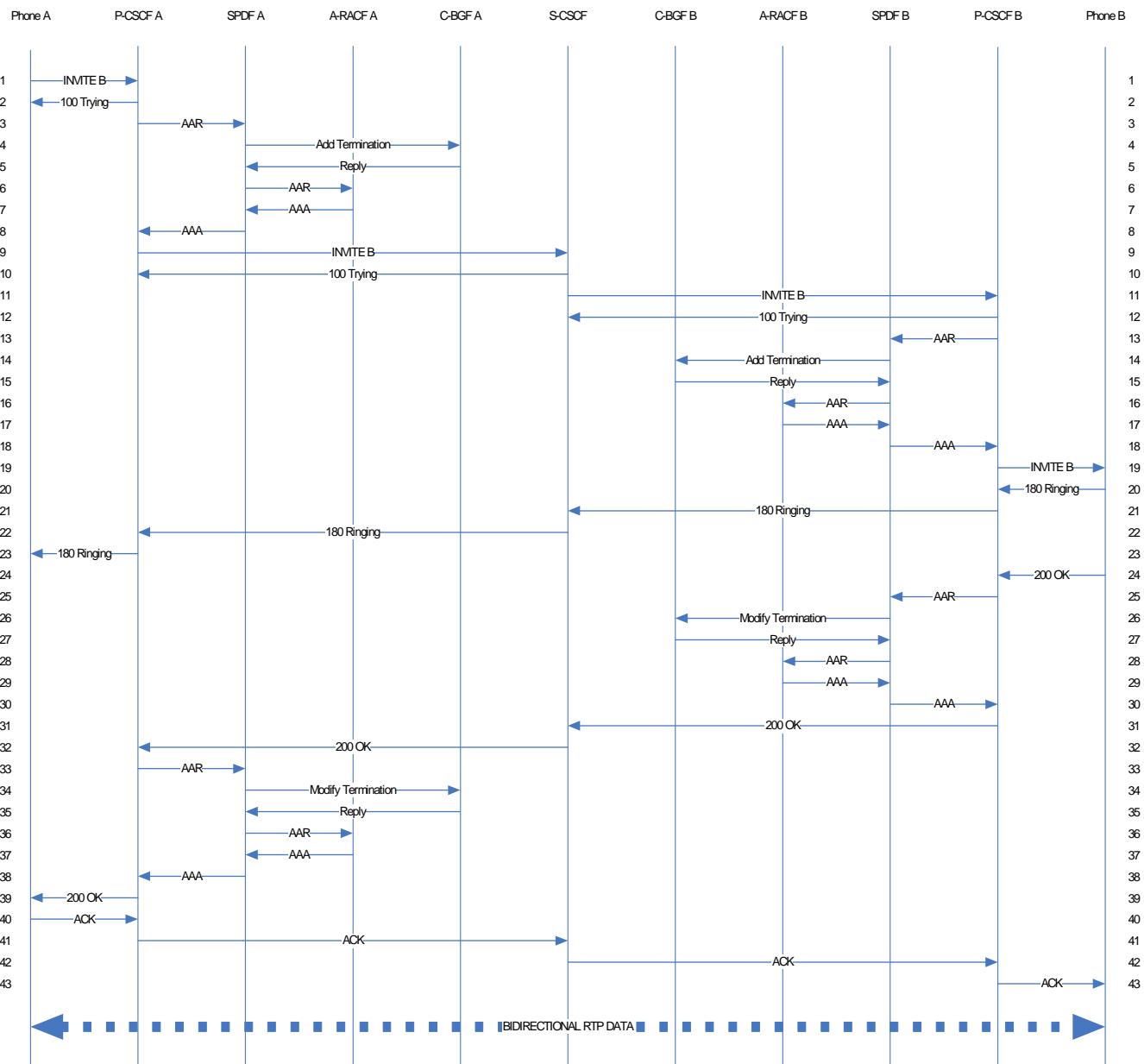


Figure 6.1.1.1: IMS end-to-end signalling chart between two SIP end-points - session setup

Table 6.1.1.1: IMS end-to-end messages between two SIP end-points - session setup

Step	Protocol	Interface	From	To	Message
1	SIP		Phone A	P-CSCF A	INVITE B
<pre> INVITE sip:user_b@example.com SIP/2.0 Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 70 Route: <sip:p-cscf-a.example.com;lr> From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Contact: <sip:user_a@phone-a.example.com> Content-Type: application/sdp Content-Length: 129 v=0 o=user_a 2890844526 2890842807 IN IP4 phone-a.example.com </pre>					

Step	Protocol	Interface	From	To	Message
			s=- c=IN IP4 192.168.0.2 t=0 0 m=audio 23942 RTP/AVP 0 a=sendrecv		
2	SIP		P-CSCF A	Phone A	100 Trying
			SIP/2.0 100 Trying Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Content-Length: 0		
3	DIAMETER	Gq'	P-CSCF A	SPDF A	AAR
	<p>The P-CSCF uses the IP address registered for signalling as the Globally-Unique-Address.</p> <p>The Gq' protocol specification [4] and the Rq protocol specification [3] both specify rules for how to assign numbers to the Flow-Number AVP and Media-Component-Number AVP respectively. The Flow-Number AVP is specified as the ordinal number of the IP flow(s), assigned according to the rules in annex C of [2] and the Media-Component-Number AVP is specified as the ordinal number of the media component, assigned according to the rules in annex C of [2]. In annex C.1 in [2] it is stated that both these numbers are to start at 1 for a given session.</p> <p>Following the rules defined in clause 4, the P-CSCF translates the single codec indicated in the m= line to bandwidth using locally configured information on the mapping between codec and bandwidth taking account for the packetization overhead (i.e. AVP/RTP 0 translates to PCMU/8000, which is 64 kbps that becomes 96 kbps plus 8 kbps with packetization overhead).</p> <p>Given the reception of a=sendrecv in the SDP the P-CSCF issues a bi-directional reservation request to the SPDF. Following the rules given in clause 5.2.1.3 the Binding-Information AVPs are set to 0.0.0.0 and 0 respectively since no addresses or ports at the core side is available.</p>				
	<pre><AA-Request> ::= < Diameter Header: 265, REQ, PXY > < Session-Id = "p-cscf-a.example.com;13815C;391" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "p-cscf-a.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } [Media-Component-Description = { Media-Component-Number = 1 } [Media-Sub-Component = { Flow-Number = 1 } [Flow-Description = "permit out 17 from any to 192.168.0.2 23942"] [Flow-Description = "permit in 17 from any to any"] [Flow-Usage = NO_INFORMATION(0)] [Max-Requested-Bandwidth-DL = 96000] [Max-Requested-Bandwidth-UL = 96000]] [Media-Sub-Component = { Flow-Number = 2 } [Flow-Description = "permit out 17 from any to 192.168.0.2 23943"] [Flow-Description = "permit in 17 from any to any"] [Flow-Usage = RTCP (1)] [Max-Requested-Bandwidth-DL = 8000] [Max-Requested-Bandwidth-UL = 8000]] [AF-Application-Identifier = "GQPRIME_SAMPLE_APP"] [Media-Type = AUDIO (0)] [Flow-Status = DISABLED] [Reservation-Priority = DEFAULT (0)]] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 192.168.0.2 } { Port-Number = 23942 }] [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 192.168.0.2 } { Port-Number = 23943 }] V4-Transport-Address = </pre>				

Step	Protocol	Interface	From	To	Message
4	H.248	Ia	SPDF A	C-BGF A	Add terminations

The default value of H.248 StreamMode is "Inactive", the H.248 Streams are by default created as "Inactive". Hence, the Mode descriptor is omitted in this message.

The Diameter <AA-Request> for an RTP flow and an RTCP flow is translated here into an H.248 Termination/Stream model by using the default RTP Specific behaviour of the BGF. Alternatively, the RTP and RTCP flows could be mapped on two separate H.248 Streams (clause 5.17.1.1 in [7]).

The specific behaviour is controlled via property gm/rsb "RTP Specific Behaviour". In this example, this property is enabled by default; hence the gm/rsb descriptor is not included in the message.

```
MEGACO/3 [spdf-a.example.com]:55555
Transaction = 1 {
    Context = ${{
        Add = ip/1/if1/$ { /* NOTE 1 */
            Media {
                Stream = 1 {
                    Local {
                        v=0
                        m=- $ - -
                        c=IN IP4 $
                        b=AS:104
                    },
                    Remote {
                        v=0
                        m=- 23942 - -
                        c=IN IP4 192.168.0.2
                        b=AS:104
                    }
                } /* Stream */
            } /* Media */
        } /* Add */
        Add = ip/1/if2/$ {
            Media {
                Stream = 1 {
                    Local {
                        v=0
                        m=- $ - -
                        c=IN IP4 $
                        b=AS:104
                    }
                } /* Stream */
            } /* Media */
        } /* Add */
    } /* Context */
} /* Transaction */
```

NOTE: The wildcard CHOOSE options are very limited, only "Id" may be wildcarded (see Table 4/ES 283 018 (2006-06)).

5	H.248	Ia	C-BGF A	SPDF A	Reply (Add)
It should be noted that H.248 replies typically contain only new information not previously given in preceding H.248 request triggering the replies. The following H.248 message and all other H.248 replies shown in the present document includes however all information offered in the H.248 request together with the new information created by the BGF. The complete information is shown to clearly illustrate the interaction between the SPDF and the BGF for the depicted scenario.					

```
MEGACO/3 [abgf-a.example.com]:55555
Reply = 1 {
    Context = 1 {
        Add = ip/1/if1/1 {
            Media {
                Stream = 1 {
                    Local {
                        v=0

```

Step	Protocol	Interface	From	To	Message
			m=- 4444 - - c=IN IP4 192.168.0.1 b=AS:104 }, Remote { v=0 m=- 23942 - - c=IN IP4 192.168.0.2 b=AS:104 } } /* Stream */ } /* Media */ } /* Add */ Add = ip/1/if2/1 { Media { Stream = 1 { Local { v=0 m=- 2222 - - c=IN IP4 10.0.0.1 b=AS:104 } } /* Stream */ } /* Media */ } /* Add */ } /* Context */ } /* Reply */		

6	DIAMETER	Rq	SPDF A	A-RACF A	AAR
The A-RACF does not need the port numbers in this scenario since it does not interrogate any entity over Re or Ra (which are not defined for RACS release 1). These numbers are however included anyway since that is the desired default behaviour. That is, the SPDF should not need to keep track of whether or not port numbers are needed. It should be noted that although source IP addresses are not provided the A-RACF can determine the sources from the Globally-Unique-Address of the subscriber (i.e. the A-RACF knows the location of each subscriber as this identifier comes associated with a Logical-Access-ID from the CLF over e4).					

```
<AA-Request> ::= < Diameter Header: 265, REQ, PXY >
    < Session-Id = "spdf-a.example.com;429C3;412" >
    { Auth-Application-Id = 16777222 (Gq) }
    { Origin-Host = "spdf-a.example.com" }
    { Origin-Realm = "example.com" }
    { Destination-Realm = "example.com" }
    [ Media-Component-Description =
        { Media-Component-Number = 1 }
        [ Media-Sub-Component =
            { Flow-Number = 1 }
            [ Flow-Description = "permit out 17 from any to 192.168.0.2 23942" ]
            [ Flow-Description = "permit in 17 from any to any" ]
            [ Flow-Usage = NO_INFORMATION(0) ]
            [ Max-Requested-Bandwidth-DL = 96000 ]
            [ Max-Requested-Bandwidth-UL = 96000 ]
        ]
        [ Media-Sub-Component =
            { Flow-Number = 2 }
            [ Flow-Description = "permit out 17 from any to 192.168.0.2 23943" ]
            [ Flow-Description = "permit in 17 from any to any" ]
            [ Flow-Usage = RTCP (1) ]
            [ Max-Requested-Bandwidth-DL = 8000 ]
            [ Max-Requested-Bandwidth-UL = 8000 ]
        ]
        [ AF-Application-Identifier = "RQ_SAMPLE_APP" ]
        [ Media-Type = AUDIO (0) ]

        [ Flow-Status = DISABLED ]
        [ Reservation-Priority = DEFAULT (0) ]
    ]
    [ Reservation-Priority = DEFAULT (0) ]
    [ Globally-Unique-Address =
        [ Framed-IP-Address = 192.168.0.2 ]
        [ Address-Realm = "example.com" ]
    ]
    [ Authorization-Lifetime = 450 ]
```

7	DIAMETER	Rq	A-RACF A	SPDF A	AAA
<AA-Answer> ::= < Diameter Header: 265, PXY >					

Step	Protocol	Interface	From	To	Message
			< Session-Id = "spdf-a.example.com;429C3;412" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "aracf-a.example.com" } { Origin-Realm = "example.com" } [Result-Code = DIAMETER_SUCCESS (2001)] [Authorization-Lifetime = 450] [Auth-Grace-Period = 10]		
8	DIAMETER	Gq'	SPDF A	P-CSCF A	AAA
9	SIP		P-CSCF A	S-CSCF	INVITE B
			INVITE sip:user_b@example.com SIP/2.0 Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 69 Record-Route: <sip:p-cscf-a.example.com;lr> From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Contact: <sip:user_a@phone-a.example.com> Content-Type: application/sdp Content-Length: 129 v=0 o=user_a 2890844526 2890842807 IN IP4 phone-a.example.com s=- c=IN IP4 10.0.0.1 t=0 0		

Step	Protocol	Interface	From	To	Message
	m=audio 2222 RTP/AVP 0 a=sendrecv				
10	SIP		S-CSCF	P-CSCF A	100 Trying
	SIP/2.0 100 Trying Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Content-Length: 0				
11	SIP		S-CSCF	P-CSCF B	INVITE B
	INVITE sip:user_b@example.com SIP/2.0 Via: SIP/2.0/UDP s-cscf.example.com:5060;branch=z9hG4bKralar Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 68 Record-Route: <sip:s-cscf.example.com;lr>,<sip:p-cscf-a.example.com;lr> From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Contact: <sip:user_a@phone-a.example.com> Content-Type: application/sdp Content-Length: 125 v=0 o=user_a 2890844526 2890842807 IN IP4 phone-a.example.com s=- c=IN IP4 10.0.0.1 t=0 0 m=audio 2222 RTP/AVP 0 a=sendrecv				
12	SIP		S-CSCF	P-CSCF B	100 Trying
	SIP/2.0 100 Trying Via: SIP/2.0/UDP s-cscf.example.com:5060;branch=z9hG4bKralar Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Content-Length: 0				
13	DIAMETER	Gq'	P-CSCF B	SPDF B	AAR
	It should be noted that the IP address registered for signalling, which equals the Globally Unique IP Address, cannot be safely assumed to also be the source IP address for media. Hence, using this address as the source address for media may cause problems in case source filtering is applied. For this reason no source IP address is provided although the IP address registered for signalling to Phone B may be the same source IP address used for media.				
	<AA-Request> ::= < Diameter Header: 265, REQ, PXY > < Session-Id = "p-cscf-b.example.com;481C43;583" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "p-cscf-b.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } [Media-Component-Description = { Media-Component-Number = 1 } [Media-Sub-Component = { Flow-Number = 1 } [Flow-Description = "permit in 17 from any to any"] [Flow-Description = "permit out 17 from any to any"] [Flow-Usage = NO_INFORMATION(0)] [Max-Requested-Bandwidth-UL = 96000] [Max-Requested-Bandwidth-DL = 96000]] [Media-Sub-Component = { Flow-Number = 2 } [Flow-Description = "permit in 17 from any to any"]				

Step	Protocol	Interface	From	To	Message	
			[Flow-Description = "permit out 17 from any to any"] [Flow-Usage = RTCP (1)] [Max-Requested-Bandwidth-UL = 8000] [Max-Requested-Bandwidth-DL = 8000]] [AF-Application-Identifier = "GQPRIME_SAMPLE_APP"] [Media-Type = AUDIO (0)] [Flow-Status = DISABLED] [Reservation-Priority = DEFAULT (0)]] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2222 }] [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2223 }] }] [Reservation-Priority = DEFAULT (0)] [Globally-Unique-Address = [Framed-IP-Address = 192.168.1.2] [Address-Realm = "example.com"]] [Authorization-Lifetime = 450]			
14	H.248	la	SPDF B	C-BGF B	Add terminations	
			MEGACO/3 [spdf-b.example.com]:43924 Transaction = 1 { Context = \$ { Add = ip/1/if1/\$ { Media { Stream = 1 { Local { v=0 m=- \$ - - c=IN IP4 \$ b=AS:104 } } /* Stream */ } /* Media */ } /* Add */ Add = ip/1/if2/\$ { Media { Stream = 1 { Local { v=0 m=- \$ - - c=IN IP4 \$ b=AS:104 }, Remote { v=0 m=- 2222 - - c=IN IP4 10.0.0.1 b=AS:104 } } /* Stream */ } /* Media */ } /* Add */ } /* Context */ } /* Transaction */			

Step	Protocol	Interface	From	To	Message
15	H.248	Ia	C-BGF B	SPDF B	Reply (Add)
					<pre> MEGACO/3 [abgf-b.example.com]:43924 Reply = 1 { Context = 1 { Add = ip/1/if1/1{ Media { Stream = 1 { Local { v=0 m=- 3332 - c=IN IP4 192.168.1.1 b=AS:104 } } /* Stream */ } /* Media */ } /* Add */ Add = ip/1/if2/1{ Media { Stream = 1 { Local { v=0 m=- 1110 - c=IN IP4 10.0.0.2 b=AS:104 }, Remote { v=0 m=- 2222 - c=IN IP4 10.0.0.1 b=AS:104 } } /* Stream */ } /* Media */ } /* Add */ } /* Context */ } /* Reply */ </pre>

16	DIAMETER	Rq	SPDF B	A-RACF B	AAR
The A-RACF determines the access line from the Globally-Unique-Address AVP since the source and destination IP addresses for that reservation endpoint are not given in the request (i.e. they are both set to "any").					


```

<AA-Request> ::= < Diameter Header: 265, REQ, PXY >
    < Session-Id = "spdf-b.example.com;41295;512" >
    { Auth-Application-Id = 16777222 (Gq) }
    { Origin-Host = "spdf-b.example.com" }
    { Origin-Realm = "example.com" }
    { Destination-Realm = "example.com" }
    [ Media-Component-Description =
        { Media-Component-Number = 1 }
        [ Media-Sub-Component =
            { Flow-Number = 1 }
            [ Flow-Description = "permit in 17 from any to 192.168.1.1 3332" ]
            [ Flow-Description = "permit out 17 from any to any" ]
            [ Flow-Usage = NO_INFORMATION(0) ]
            [ Max-Requested-Bandwidth-UL = 96000 ]
            [ Max-Requested-Bandwidth-DL = 96000 ]
        ]
        [ Media-Sub-Component =
            { Flow-Number = 2 }
            [ Flow-Description = "permit in 17 from any to 192.168.1.1 3333" ]
            [ Flow-Description = "permit out 17 from any to any" ]
            [ Flow-Usage = RTPC (1) ]
            [ Max-Requested-Bandwidth-UL = 8000 ]
            [ Max-Requested-Bandwidth-DL = 8000 ]
        ]
        [ AF-Application-Identifier = "RQ_SAMPLE_APP" ]
        [ Media-Type = AUDIO (0) ]
        [ Flow-Status = DISABLED ]
        [ Reservation-Priority = DEFAULT (0) ]
    ]
    [ Reservation-Priority = DEFAULT (0) ]
    [ Globally-Unique-Address =
        [ Framed-IP-Address = 192.168.1.2 ]
        [ Address-Realm = "example.com" ]
    ]

```

Step	Protocol	Interface	From	To	Message
[Authorization-Lifetime = 450]					
17	DIAMETER	Rq	A-RACF B	SPDF B	AAA
<pre><AA-Answer> ::= < Diameter Header: 265, PXY > < Session-Id = "spdf-b.example.com;41295;512" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "aracf-b.example.com" } { Origin-Realm = "example.com" } [Result-Code = DIAMETER_SUCCESS (2001)] [Authorization-Lifetime = 450] [Auth-Grace-Period = 10]</pre>					
18	DIAMETER	Gq'	SPDF B	P-CSCF B	AAA
<pre><AA-Answer> ::= < Diameter Header: 265, PXY > < Session-Id = "p-cscf-b.example.com;481C43;583" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "spdf-b.example.com" } { Origin-Realm = "example.com" } [Result-Code = DIAMETER_SUCCESS (2001)] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2222 }] [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2223 }] } [Binding-Output-List = [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 192.168.1.1 } { Port-Number = 3332 }] [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 192.168.1.1 } { Port-Number = 3333 }]]] [Authorization-Lifetime = 450] [Auth-Grace-Period = 10]</pre>					
19	SIP		P-CSCF B	Phone B	INVITE B
<pre>INVITE sip:user_b@example.com SIP/2.0 Via: SIP/2.0/UDP p-cscf-b.example.com:5060;branch=z9hG4bKs1pp0 Via: SIP/2.0/UDP s-cscf.example.com:5060;branch=z9hG4bKralar Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 67 Record-Route: <sip:p-cscf-b.example.com;lr>,<sip:s-cscf.example.com;lr>,<sip:p-cscf-a.example.com;lr> From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Contact: <sip:user_a@phone-a.example.com></pre>					

Step	Protocol	Interface	From	To	Message
			Content-Type: application/sdp Content-Length: 128		
			v=0 o=user_a 2890844526 2890842807 IN IP4 phone-a.example.com s=- c=IN IP4 192.168.1.1 t=0 0 m=audio 3332 RTP/AVP 0 a=sendrecv		
20	SIP		Phone B	P-CSCF B	180 Ringing
			SIP/2.0 180 Ringing Via: SIP/2.0/UDP p-cscf-b.example.com:5060;branch=z9hG4bKs1pp0 Via: SIP/2.0/UDP s-cscf.example.com:5060;branch=z9hG4bKralar Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Record-Route: <sip:p-cscf-b.example.com;lr>,<sip:s-cscf.example.com;lr>,<sip:p-cscf-a.example.com;lr> From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com Contact: <sip:user_b@phone-b.example.com> CSeq: 1 INVITE Content-Type: application/sdp Content-Length: 0		
21	SIP		P-CSCF B	S-CSCF	180 Ringing
			SIP/2.0 180 Ringing Via: SIP/2.0/UDP s-cscf.example.com:5060;branch=z9hG4bKralar Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Record-Route: <sip:s-cscf.example.com;lr>,<sip:p-cscf-a.example.com;lr> From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com Contact: <sip:user_b@phone-b.example.com> CSeq: 1 INVITE Content-Type: application/sdp Content-Length: 0		
22	SIP		S-CSCF	P-CSCF A	180 Ringing
			SIP/2.0 180 Ringing Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Record-Route: <sip:p-cscf-a.example.com;lr> From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com Contact: <sip:user_b@phone-b.example.com> CSeq: 1 INVITE Content-Type: application/sdp Content-Length: 0		
23	SIP		P-CSCF A	Phone A	180 Ringing
			SIP/2.0 180 Ringing Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Record-Route: <sip:p-cscf-a.example.com;lr> From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com Contact: <sip:user_b@phone-b.example.com> CSeq: 1 INVITE Content-Type: application/sdp Content-Length: 0		
24	SIP		Phone B	P-CSCF B	200 OK (SDP)
			SIP/2.0 200 OK Via: SIP/2.0/UDP p-cscf-b.example.com:5060;branch=z9hG4bKs1pp0 Via: SIP/2.0/UDP s-cscf.example.com:5060;branch=z9hG4bKralar Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml		

Step	Protocol	Interface	From	To	Message
<pre>Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 70 From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Contact: <sip:user_b@phone-b.example.com> Content-Type: application/sdp Content-Length: 119 v=0 o=user_b 29381748101 2948193018 IN IP4 phone-b.example.com s=- c=IN IP4 192.168.1.2 t=0 0 m=audio 29792 RTP/AVP 0</pre>					
<p>25 DIAMETER Gq' P-CSCF B SPDF B AAR (Modify)</p>					
<p>In this AAR modifying an existing session both in and out Flow-Description AVPs and both the Max-Requested-Bandwidth-UL and the Max-Requested-Bandwidth-DL are provided in the request. Although this may seem be redundant information (as the in Flow-Description AVP and Max-Requested-Bandwidth-UL are already provided to RACS) the Gq' specification does not explicitly allow any of those AVPs to be omitted. Hence, they are all included.</p>					
<pre><AA-Request> ::= < Diameter Header: 265, REQ, PXY > < Session-Id = "p-cscf-b.example.com;481C43;583" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "p-cscf-b.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } [Media-Component-Description = { Media-Component-Number = 1 } [Media-Sub-Component = { Flow-Number = 1 } [Flow-Description = "permit out 17 from any to 192.168.1.2 29792"] [Flow-Description = "permit in 17 from any to 192.168.1.1 3332"] [Flow-Usage = NO_INFORMATION(0)] [Max-Requested-Bandwidth-DL = 96000] [Max-Requested-Bandwidth-UL = 96000]] [Media-Sub-Component = { Flow-Number = 2 } [Flow-Description = "permit out 17 from any to 192.168.1.2 29793"] [Flow-Description = "permit in 17 from any to 192.168.1.1 3333"] [Flow-Usage = RTCP (1)] [Max-Requested-Bandwidth-DL = 8000] [Max-Requested-Bandwidth-UL = 8000]] [AF-Application-Identifier = "GQPRIME_SAMPLE_APP"] [Media-Type = AUDIO (0)] [Flow-Status = ENABLED] [Reservation-Priority = DEFAULT (0)]] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 192.168.1.2 } { Port-Number = 29792 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2222 }] [V4-Transport-Address = { Framed-IP-Address = 192.168.1.2 } { Port-Number = 29793 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2223 }] }] [Reservation-Priority = DEFAULT (0)] [Globally-Unique-Address = { Framed-IP-Address = 192.168.1.2 } { Address-Realm = "example.com" }] </pre>					

Step	Protocol	Interface	From	To	Message
]
					[Authorization-Lifetime = 450]
26	H.248	Ia	SPDF B	C-BGF B	Modify terminations
					MEGACO/3 [spdf-b.example.com]:43924
					Transaction = 2 {
					Context = 1 {
					Modify = ip/1/if1/1 {
					Media {
					Stream = 1 {
					LocalControl {
					Mode=SendRecv
					},
					Local {
					v=0
					m=- 3332 - -
					c=IN IP4 192.168.1.1
					b=AS:104
					}
					Remote {
					v=0
					m=- 29792 - -
					c=IN IP4 192.168.1.2
					b=AS:104
					}
					} /* Stream */
					} /* Media */
					} /* Modify */
					Modify = ip/1/if2/1 {
					Media {
					Stream = 1 {
					LocalControl {
					Mode=SendRecv
					},
					Local {
					v=0
					m=- 1110 - -
					c=IN IP4 10.0.0.2
					b=AS:104
					},
					Remote {
					v=0
					m=- 2222 - -
					c=IN IP4 10.0.0.1
					b=AS:104
					}
					} /* Stream */
					} /* Media */
					} /* Modify */
					} /* Context */
					} /* Transaction */
27	H.248	Ia	C-BGF B	SPDF B	Reply (Modify)
					MEGACO/3 [abgf-b.example.com]: 43924
					Reply = 2 {
					Context = 1 {
					Modify = ip/1/if1/1 {
					Media {
					Stream = 1 {
					LocalControl {
					Mode=SendRecv
					},
					Local {
					v=0
					m=- 3332 - -
					c=IN IP4 192.168.1.1
					b=AS:104
					},
					Remote {
					v=0
					m=- 29792 - -
					c=IN IP4 192.168.1.2
					b=AS:104
					}

Step	Protocol	Interface	From	To	Message
			<pre> } /* Stream */ } /* Media */ } /* Modify */ Modify = ip/1/if2/1 { Media { Stream = 1 { LocalControl { Mode=SendRecv }, Local { v=0 m=- 1110 -- c=IN IP4 10.0.0.2 b=AS:104 }, Remote { v=0 m=- 2222 -- c=IN IP4 10.0.0.1 b=AS:104 } } /* Stream */ } /* Media */ } /* Modify */ } /* Context */ } /* Reply */ </pre>		

28	DIAMETER	Rq	SPDF B	A-RACF B	AAR (Modify)
<pre> <AA-Request> ::= < Diameter Header: 265, REQ, PXY > < Session-Id = "spdf-b.example.com;41295;512" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "spdf-b.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } [Media-Component-Description = { Media-Component-Number = 1 } [Media-Sub-Component = { Flow-Number = 1 } [Flow-Description = "permit out 17 from any to 192.168.1.2 29792"] [Flow-Description = "permit in 17 from any to 192.168.1.1 3332"] [Flow-Usage = NO_INFORMATION(0)] [Max-Requested-Bandwidth-UL = 96000] [Max-Requested-Bandwidth-DL = 96000]] [Media-Sub-Component = { Flow-Number = 2 } [Flow-Description = "permit out 17 from any to 192.168.1.2 29793"] [Flow-Description = "permit in 17 from any to 192.168.1.1 3333"] [Flow-Usage = RTCP(1)] [Max-Requested-Bandwidth-UL = 8000] [Max-Requested-Bandwidth-DL = 8000]] [AF-Application-Identifier = "RQ_SAMPLE_APP"] [Media-Type = AUDIO (0)] [Flow-Status = ENABLED] [Reservation-Priority = DEFAULT (0)]] [Reservation-Priority = DEFAULT (0)] [Globally-Unique-Address = [Framed-IP-Address = 192.168.1.2] [Address-Realm = "example.com"]] [Authorization-Lifetime = 450] </pre>					

29	DIAMETER	Rq	A-RACF B	SPDF B	AAA (Modify)
<pre> <AA-Answer> ::= < Diameter Header: 265, PXY > < Session-Id = "spdf-b.example.com;41295;512" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "aracf-b.example.com" } { Origin-Realm = "example.com" } [Result-Code = DIAMETER_SUCCESS (2001)] [Authorization-Lifetime = 450] [Auth-Grace-Period = 10] </pre>					

Step	Protocol	Interface	From	To	Message
30	DIAMETER	Gq'	SPDF B	P-CSCF B	AAA (Modify)
					<pre><AA-Answer> ::= < Diameter Header: 265, PXY > < Session-Id = "p-cscf-b.example.com;481C43;583" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "spdf-b.example.com" } { Origin-Realm = "example.com" } [Result-Code = DIAMETER_SUCCESS (2001)] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 192.168.1.2 } { Port-Number = 29792 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2222 }] [V4-Transport-Address = { Framed-IP-Address = 192.168.1.2 } { Port-Number = 29793 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2223 }] } [Binding-Output-List = 10.0.0.2 [V4-Transport-Address = { Framed-IP-Address = 10.0.0.2 } { Port-Number = 1110 }] [V4-Transport-Address = { Framed-IP-Address = 192.168.1.1 } { Port-Number = 3332 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.2 } { Port-Number = 1111 }] [V4-Transport-Address = { Framed-IP-Address = 192.168.1.1 } { Port-Number = 3333 }]]] [Authorization-Lifetime = 450] [Auth-Grace-Period = 10]</pre>
31	SIP		P-CSCF B	S-CSCF	200 OK (SDP)
					<pre>SIP/2.0 200 OK Via: SIP/2.0/UDP s-cscf.example.com:5060;branch=z9hG4bKralar Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 69 From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Contact: <sip:user_b@phone-b.example.com> Content-Type: application/sdp Content-Length: 126 v=0 o=user_b 29381748101 2948193018 IN IP4 phone-b.example.com s=- c=IN IP4 10.0.0.2 t=0 0 m=audio 1110 RTP/AVP 0 a=sendrecv</pre>
32	SIP		S-CSCF	P-CSCF A	200 OK (SDP)
					<pre>SIP/2.0 200 OK Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml</pre>

Step	Protocol	Interface	From	To	Message
<pre>Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 68 From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Contact: <sip:user_b@phone-b.example.com> Content-Type: application/sdp Content-Length: 126 v=0 o=user_b 29381748101 2948193018 IN IP4 phone-b.example.com s=- c=IN IP4 10.0.0.2 t=0 0 m=audio 1110 RTP/AVP 0 a=sendrecv</pre>					
<pre>33 DIAMETER Gq' P-CSCF A SPDF A AAR (Modify)</pre>					
<pre><AA-Request> ::= < Diameter Header: 265, REQ, PXY > < Session-Id = "p-cscf-a.example.com;13815C;391" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "p-cscf-a.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } [Media-Component-Description = { Media-Component-Number = 1 } [Media-Sub-Component = { Flow-Number = 1 } [Flow-Description = "permit in 17 from any to any"] [Flow-Description = "permit out 17 from any to 192.168.0.2 23942"] [Flow-Usage = NO_INFORMATION(0)] [Max-Requested-Bandwidth-UL = 96000] [Max-Requested-Bandwidth-DL = 96000]] [Media-Sub-Component = { Flow-Number = 2 } [Flow-Description = "permit in 17 from any to any"] [Flow-Description = "permit out 17 from any to 192.168.0.2 23943"] [Flow-Usage = RTP(1)] [Max-Requested-Bandwidth-UL = 8000] [Max-Requested-Bandwidth-DL = 8000]] [AF-Application-Identifier = "GQPRIME_SAMPLE_APP"] [Media-Type = AUDIO (0)] [Flow-Status = ENABLED] [Reservation-Priority = DEFAULT (0)]] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 192.168.0.2 } { Port-Number = 23942 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.2 } { Port-Number = 1110 }] [V4-Transport-Address = { Framed-IP-Address = 192.168.0.2 } { Port-Number = 23943 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.2 } { Port-Number = 1111 }] }] [Reservation-Priority = DEFAULT (0)] [Globally-Unique-Address = { Framed-IP-Address = 192.168.0.2 } [Address-Realm = "example.com"]] [Authorization-Lifetime = 450] </pre>					

Step	Protocol	Interface	From	To	Message
34	H.248	Ia	SPDF A	C-BGF A	Modify Terminations A (A to B)
<pre> MEGACO/3 [spdf-a.example.com]:55555 Transaction = 2 { Context = 1 { Modify = ip/1/if1/1 { Media { Stream = 1 { LocalControl { Mode=SendRecv }, Local { v=0 m=- 4444 -- c=IN IP4 192.168.0.1 b=AS:104 }, Remote { v=0 m=- 23942 -- c=IN IP4 192.168.0.2 b=AS:104 } } /* Stream */ } /* Media */ } /* Modify */ Modify = ip/1/if2/1 { Media { Stream = 1 { LocalControl { Mode=SendRecv }, Local { v=0 m=- 2222 -- c=IN IP4 10.0.0.1 b=AS:104 }, Remote { v=0 m=- 1110 -- c=IN IP4 10.0.0.2 b=AS:104 } } /* Stream */ } /* Media */ } /* Modify */ } /* Context */ } /* Transaction */ </pre>					
35	H.248	Ia	C-BGF A	SPDF A	Reply (Modify)
<pre> MEGACO/3 [abgf-a.example.com]:55555 Reply = 2 { Context = 1 { Modify = ip/1/if1/1 { Media { Stream = 1 { LocalControl { Mode=SendRecv }, Local { v=0 m=- 4444 -- c=IN IP4 192.168.0.1 b=AS:104 }, Remote { v=0 m=- 23942 -- c=IN IP4 192.168.0.2 b=AS:104 } } /* Stream */ } /* Media */ } /* Modify */ } /* Context */ } /* Transaction */ </pre>					

Step	Protocol	Interface	From	To	Message
<pre> } } /* Stream */ } /* Media */ } /* Modify */ Modify = ip/1/if2/1 { Media { Stream = 1 { LocalControl { Mode=SendRecv }, Local { v=0 m=- 2222 - c=IN IP4 10.0.0.1 b=AS:104 }, Remote { v=0 m=- 1110 - c=IN IP4 10.0.0.2 b=AS:104 } } /* Stream */ } /* Media */ } /* Modify */ } /* Context */ } /* Reply */ </pre>					

36	DIAMETER	Rq	SPDF A	A-RACF A	AAR (Modify)
----	----------	----	--------	----------	--------------

```

<AA-Request> ::= < Diameter Header: 265, REQ, PXY >
    < Session-Id = "spdf-a.example.com;429C3;412" >
    { Auth-Application-Id = 16777222 (Gq) }
    { Origin-Host = "spdf-a.example.com" }
    { Origin-Realm = "example.com" }
    { Destination-Realm = "example.com" }
    [ Media-Component-Description =
        { Media-Component-Number = 1 }
        [ Media-Sub-Component =
            { Flow-Number = 1 }
            [ Flow-Description = "permit out 17 from any to 192.168.0.2 23942" ]
            [ Flow-Description = "permit in 17 from any to 192.168.0.1 4444" ]
            [ Flow-Usage = NO_INFORMATION(0) ]
            [ Max-Requested-Bandwidth-UL = 96000 ]
            [ Max-Requested-Bandwidth-DL = 96000 ]
        ]
        [ Media-Sub-Component =
            { Flow-Number = 2 }
            [ Flow-Description = "permit out 17 from any to 192.168.0.2 23943" ]
            [ Flow-Description = "permit in 17 from any to 192.168.0.1 4445" ]
            [ Flow-Usage = RTPC(1) ]
            [ Max-Requested-Bandwidth-UL = 8000 ]
            [ Max-Requested-Bandwidth-DL = 8000 ]
        ]
        [ AF-Application-Identifier = "RQ_SAMPLE_APP" ]
        [ Media-Type = AUDIO (0) ]
        [ Flow-Status = ENABLED ]
        [ Reservation-Priority = DEFAULT (0) ]
    ]
    [ Reservation-Priority = DEFAULT (0) ]
    [ Globally-Unique-Address =
        [ Framed-IP-Address = 192.168.0.2 ]
        [ Address-Realm = "example.com" ]
    ]
    [ Authorization-Lifetime = 450 ]

```

37	DIAMETER	Rq	A-RACF A	SPDF A	AAA (Modify)
<pre> <AA-Answer> ::= < Diameter Header: 265, PXY > < Session-Id = "spdf-a.example.com;429C3;412" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "aracf-a.example.com" } { Origin-Realm = "example.com" } </pre>					

Step	Protocol	Interface	From	To	Message
			[Result-Code = DIAMETER_SUCCESS (2001)] [Authorization-Lifetime = 450] [Auth-Grace-Period = 10]		
38	DIAMETER	Gq'	SPDF A	P-CSCF A	AAA (Modify)
			<AA-Answer> ::= < Diameter Header: 265, PXY > < Session-Id = "p-cscf-a.example.com;13815C;391" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "spdf-a.example.com" } { Origin-Realm = "example.com" } [Result-Code = DIAMETER_SUCCESS (2001)] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 192.168.0.2 } { Port-Number = 23942 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.2 } { Port-Number = 1110 }] [V4-Transport-Address = { Framed-IP-Address = 192.168.0.2 } { Port-Number = 23943 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.2 } { Port-Number = 1111 }] } [Binding-Output-List = [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2222 }] [V4-Transport-Address = { Framed-IP-Address = 192.168.0.1 } { Port-Number = 4444 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2223 }] [V4-Transport-Address = { Framed-IP-Address = 192.168.0.1 } { Port-Number = 4445 }]]] [Authorization-Lifetime = 450] { Auth-Grace-Period = 10 }		
39	SIP			P-CSCF A	Phone A
			SIP/2.0 200 OK Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 67 From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Contact: <sip:user_b@phone-b.example.com> Content-Type: application/sdp Content-Length: 129 v=0 o=user_b 29381748101 2948193018 IN IP4 phone-b.example.com s=- c=IN IP4 192.168.0.1 t=0 0 m=audio 4444 RTP/AVP 0 a=sendrecv		200 OK (SDP)

Step	Protocol	Interface	From	To	Message
40	SIP		Phone A	P-CSCF A	ACK
					ACK sip:user_b@example.com SIP/2.0 Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 70 Route: <sip:p-cscf-a.example.com;lr>,<sip:s-cscf.example.com;lr>,<sip:p-cscf-b.example.com;lr> From: User A <sip:user_a@example.com>;tag=348123 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 ACK Content-Length: 0
41	SIP			P-CSCF A	ACK
					ACK sip:user_b@example.com SIP/2.0 Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 69 Route: <sip:s-cscf.example.com;lr>,<sip:p-cscf-b.example.com;lr> From: User A <sip:user_a@example.com>;tag=348123 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 ACK Content-Length: 0
42	SIP			S-CSCF	ACK
					ACK sip:user_b@example.com SIP/2.0 Via: SIP/2.0/UDP s-cscf.example.com:5060;branch=z9hG4bKralar Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 68 Route: <sip:p-cscf-b.example.com;lr> From: User A <sip:user_a@example.com>;tag=348123 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 ACK Content-Length: 0
43	SIP			P-CSCF B	ACK
					ACK sip:user_b@example.com SIP/2.0 Via: SIP/2.0/UDP p-cscf-b.example.com:5060;branch=z9hG4bKs1pp0 Via: SIP/2.0/UDP s-cscf.example.com:5060;branch=z9hG4bKralar Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060; branch=z9hG4bK74b03 Max-Forwards: 67 From: User A <sip:user_a@example.com>;tag=348123 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 ACK Content-Length: 0

6.1.2 Session termination

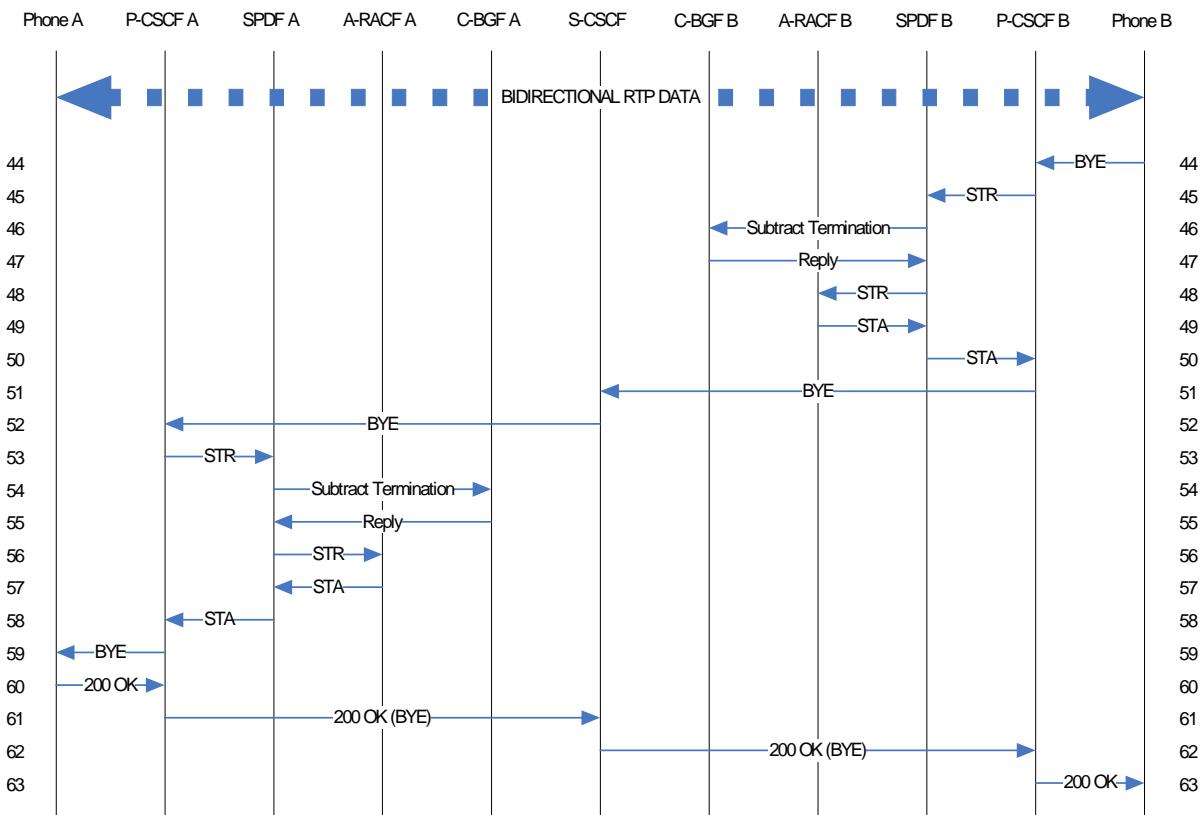


Figure 6.1.2.1: MS end-to-end signalling chart between two SIP end-points - session teardown

Table 6.1.2.1: IMS end-to-end messages between two SIP end-points - session teardown

Step	Protocol	Interface	From	To	Message
44	SIP		Phone B	P-CSCF B	BYE
					<pre>BYE sip:user_a@example.com SIP/2.0 Via: SIP/2.0/UDP phone-b.example.com:5060;branch=z9hG4bKjwafcb9 Max-Forwards: 70 Route: <sip:p-cscf-b.example.com;lr>,<sip:s-cscf.example.com;lr>,<sip:p-cscf-a.example.com;lr> From: User B <sip:user_b@example.com>;tag=4fxdce121s To: User A <sip:user_a@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 BYE Content-Length: 0</pre>
45	DIAMETER	Gq'	P-CSCF B	SPDF B	STR
					<pre><ST-Request> ::= < Diameter Header: 275, REQ, PXY > < Session-Id = "p-cscf-b.example.com;481C43;583" > { Origin-Host = "p-cscf-b.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } { Auth-Application-Id = 16777222 (Gq) }</pre>
46	H.248	Ia	SPDF B	C-BGF B	Subtract termination B
					<pre>MEGACO/3 [spdf-b.example.com]:43924 Transaction = 3 { Context = 1 { Subtract = ip/1/if1/1 {Audit{Statistics}} Subtract = ip/1/if2/1 {Audit{Statistics}} } /* Context */ } /* Transaction */</pre>
47	H.248	Ia	C-BGF B	SPDF B	Reply

Step	Protocol	Interface	From	To	Message
MEGACO/3 [abgf-b.example.com]:43924					
	Reply = 3 {				
	Context = 1 {				
	Subtract = ip/1/if1/1 {				
	Statistics {				
	nt/dur=450000, ; in milliseconds				
	nt/os=5400000, ; Octets Sent				
	nt/or=5400000, ; Octets Received				
	gm/dp=0 ; number of packets discarded				
	}				
	}				
	Subtract = ip/1/if2/1 {				
	Statistics {				
	nt/dur=450000, ; in milliseconds				
	nt/os=450000, ; Octets Sent				
	nt/or=450000, ; Octets Received				
	gm/dp=0 ; number of packets discarded				
	} /* Statistics */				
	} /* Subtract */				
	} /* Context */				
	} /* Reply */				
48	DIAMETER	Rq	SPDF B	A-RACF B	STR
	<ST-Request> ::= < Diameter Header: 275, REQ, PXY >				
	< Session-Id = "spdf-b.example.com;41295;512" >				
	{ Origin-Host = "spdf-b.example.com" }				
	{ Origin-Realm = "example.com" }				
	{ Destination-Realm = "example.com" }				
	{ Auth-Application-Id = 16777222 (Gq) }				
49	DIAMETER	Rq	A-RACF B	SPDF B	STA
	<ST-Answer> ::= < Diameter Header: 275, PXY >				
	< Session-Id = "spdf-b.example.com;41295;512" >				
	{ Origin-Host = "aracf-b.example.com" }				
	{ Origin-Realm = "example.com" }				
	{ Destination-Realm = "example.com" }				
	{ Auth-Application-Id = 16777222 (Gq) }				
	[Result-Code = DIAMETER_SUCCESS (2001)]				
50	DIAMETER	Gq	SPDF B	P-CSCF B	STA
	<ST-Answer> ::= < Diameter Header: 275, PXY >				
	< Session-Id = "p-cscf-b.example.com;481C43;583" >				
	{ Origin-Host = "spdf-b.example.com" }				
	{ Origin-Realm = "example.com" }				
	{ Destination-Realm = "example.com" }				
	{ Auth-Application-Id = 16777222 (Gq) }				
	[Result-Code = DIAMETER_SUCCESS (2001)]				
51	SIP		P-CSCF B	S-CSCF	BYE
	BYE sip:user_a@example.com SIP/2.0				
	Via: SIP/2.0/UDP p-cscf-b.example.com:5060;branch=z9hG4bKs1pp0				
	Via: SIP/2.0/UDP phone-b.example.com:5060;branch=z9hG4bKjwafcb9				
	Max-Forwards: 69				
	Route: <sip:s-cscf.example.com;lr>,<sip:p-cscf-a.example.com;lr>				
	From: User B <sip:user_b@example.com>;tag=4fxdce12ls				
	To: User A <sip:user_a@example.com>				
	Call-ID: 398174293@phone-a.example.com				
	CSeq: 1 BYE				
	Content-Length: 0				
52	SIP		S-CSCF	P-CSCF A	BYE
	BYE sip:user_a@example.com SIP/2.0				
	Via: SIP/2.0/UDP s-cscf.example.com:5060;branch=z9hG4bKralar				
	Via: SIP/2.0/UDP p-cscf-b.example.com:5060;branch=z9hG4bKs1pp0				
	Via: SIP/2.0/UDP phone-b.example.com:5060;branch=z9hG4bKjwafcb9				
	Max-Forwards: 68				
	Route: <sip:p-cscf-a.example.com;lr>				
	From: User B <sip:user_b@example.com>;tag=4fxdce12ls				
	To: User A <sip:user_a@example.com>				
	Call-ID: 398174293@phone-a.example.com				
	CSeq: 1 BYE				

Step	Protocol	Interface	From	To	Message
Content-Length: 0					
53	DIAMETER	Gq'	P-CSCF A	SPDF A	STR
<ST-Request> ::= < Diameter Header: 275, REQ, PXY > < Session-Id = "p-cscf-a.example.com;13815C;391" > { Origin-Host = "p-cscf-a.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } { Auth-Application-Id = 16777222 (Gq) }					
54	H.248	Ia	SPDF A	C-BGF A	Subtract Termination A
MEGACO/3 [spdf-a.example.com]:5555 Transaction = 3 { Context = 1 { Subtract = ip/1/if1/1 {Audit{Statistics}} Subtract = ip/1/if2/1 {Audit{Statistics}} } /* Context */ } /* Transaction */					
55	H.248	Ia	C-BGF A	SPDF A	Reply
MEGACO/3 [abgf-a.example.com]:21398 Reply = 3 { Context = 1 { Subtract = ip/1/if1/1 { Statistics { nt/dur=450000, ; in milliseconds nt/os=5400000, ; Octets Sent nt/or=5400000, ; Octets Received gm/dp=0 ; number of packets discarded } } Subtract = ip/1/if1/2 { Statistics { nt/dur=450000, ; in milliseconds nt/os=450000, ; Octets Sent nt/or=450000, ; Octets Received gm/dp=0 ; number of packets discarded } /* Statistics */ } /* Subtract */ } /* Context */ } /* Reply */					
56	DIAMETER	Rq	SPDF A	A-RACF A	STR
<ST-Request> ::= < Diameter Header: 275, REQ, PXY > < Session-Id = "spdf-a.example.com;429C3;412" > { Origin-Host = "spdf-a.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } { Auth-Application-Id = 16777222 (Gq) }					
57	DIAMETER	Rq	A-RACF A	SPDF A	STA
<ST-Answer> ::= < Diameter Header: 275, PXY > < Session-Id = "spdf-a.example.com;429C3;412" > { Origin-Host = "aracf-a.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } { Auth-Application-Id = 16777222 (Gq) } [Result-Code = DIAMETER_SUCCESS (2001)]					
58	DIAMETER	Gq'	SPDF A	P-CSCF A	STA
<ST-Answer> ::= < Diameter Header: 275, PXY > < Session-Id = "p-cscf-a.example.com;13815C;391" > { Origin-Host = "spdf-a.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } { Auth-Application-Id = 16777222 (Gq) } [Result-Code = DIAMETER_SUCCESS (2001)]					

Step	Protocol	Interface	From	To	Message
59	SIP		P-CSCF B	Phone A	BYE
					<pre> BYE sip:user_a@example.com SIP/2.0 Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKs1pp0 Via: SIP/2.0/UDP s-cscf.example.com:5060;branch=z9hG4bKralar Via: SIP/2.0/UDP p-cscf-b.example.com:5060;branch=z9hG4bKs1pp0 Via: SIP/2.0/UDP phone-b.example.com:5060;branch=z9hG4bKjwafcb9 Max-Forwards: 67 From: User B <sip:user_b@example.com>;tag=4fxdce12ls To: User A <sip:user_a@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 BYE Content-Length: 0 </pre>
60	SIP		Phone A	P-CSCF A	200 OK (BYE)
					<pre> SIP/2.0 200 OK Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKs1pp0 Via: SIP/2.0/UDP s-cscf.example.com:5060;branch=z9hG4bKralar Via: SIP/2.0/UDP p-cscf-b.example.com:5060;branch=z9hG4bKs1pp0 Via: SIP/2.0/UDP phone-b.example.com:5060;branch=z9hG4bKjwafcb9 Max-Forwards: 70 From: User B <sip:user_b@example.com>;tag=4fxdce12ls To: User A <sip:user_a@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 BYE Content-Length: 0 </pre>
61	SIP		P-CSCF A	S-CSCF	200 OK (BYE)
					<pre> SIP/2.0 200 OK Via: SIP/2.0/UDP s-cscf.example.com:5060;branch=z9hG4bKralar Via: SIP/2.0/UDP p-cscf-b.example.com:5060;branch=z9hG4bKs1pp0 Via: SIP/2.0/UDP phone-b.example.com:5060;branch=z9hG4bKjwafcb9 Max-Forwards: 69 From: User B <sip:user_b@example.com>;tag=4fxdce12ls To: User A <sip:user_a@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 BYE Content-Length: 0 </pre>
62	SIP		S-CSCF	P-CSCF B	200 OK (BYE)
					<pre> SIP/2.0 200 OK Via: SIP/2.0/UDP p-cscf-b.example.com:5060;branch=z9hG4bKs1pp0 Via: SIP/2.0/UDP phone-b.example.com:5060;branch=z9hG4bKjwafcb9 Max-Forwards: 68 From: User B <sip:user_b@example.com>;tag=4fxdce12ls To: User A <sip:user_a@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 BYE Content-Length: 0 </pre>
63	SIP		P-CSCF B	Phone B	200 OK (BYE)
					<pre> SIP/2.0 200 OK Via: SIP/2.0/UDP phone-b.example.com:5060;branch=z9hG4bKjwafcb9 Max-Forwards: 67 From: User B <sip:user_b@example.com>;tag=4fxdce12ls To: User A <sip:user_a@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 BYE Content-Length: 0 </pre>

6.2 IMS signalling flow involving IBCF entities

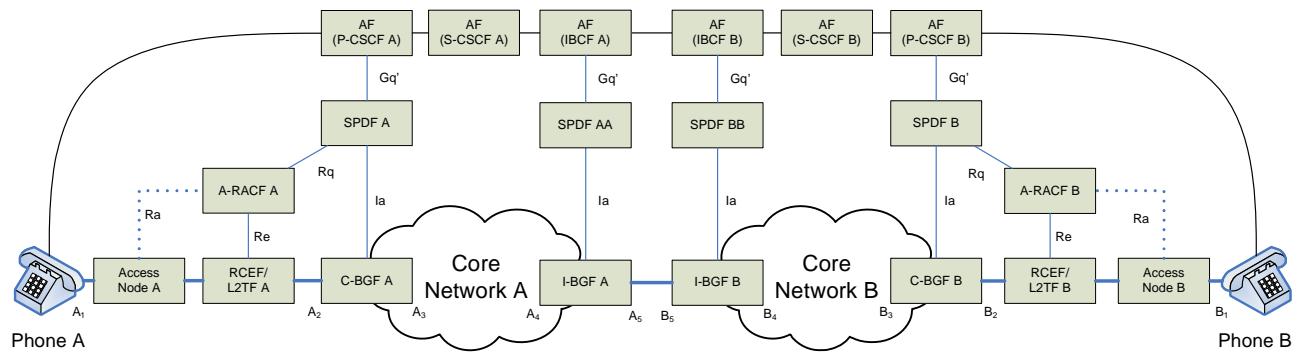


Figure 6.2.1: IMS end-to-end signalling flow between two SIP end-points - including IBGF

The additional addresses and ports used in the example compared to the basic call flow described in clause 5.1 are as follows:

- $A_4 = 10.0.0.3:5554$ for RTP and $10.0.0.3:5555$ for RTCP.
- $A_5 = 10.0.1.1:6666$ for RTP and $10.0.1.1:6667$ for RTCP.
- $B_4 = 10.0.0.5:7776$ for RTP and $10.0.0.5:7777$ for RTCP.
- $B_5 = 10.0.1.2:8888$ for RTP and $10.0.1.2:8889$ for RTCP.

6.2.1 Session setup

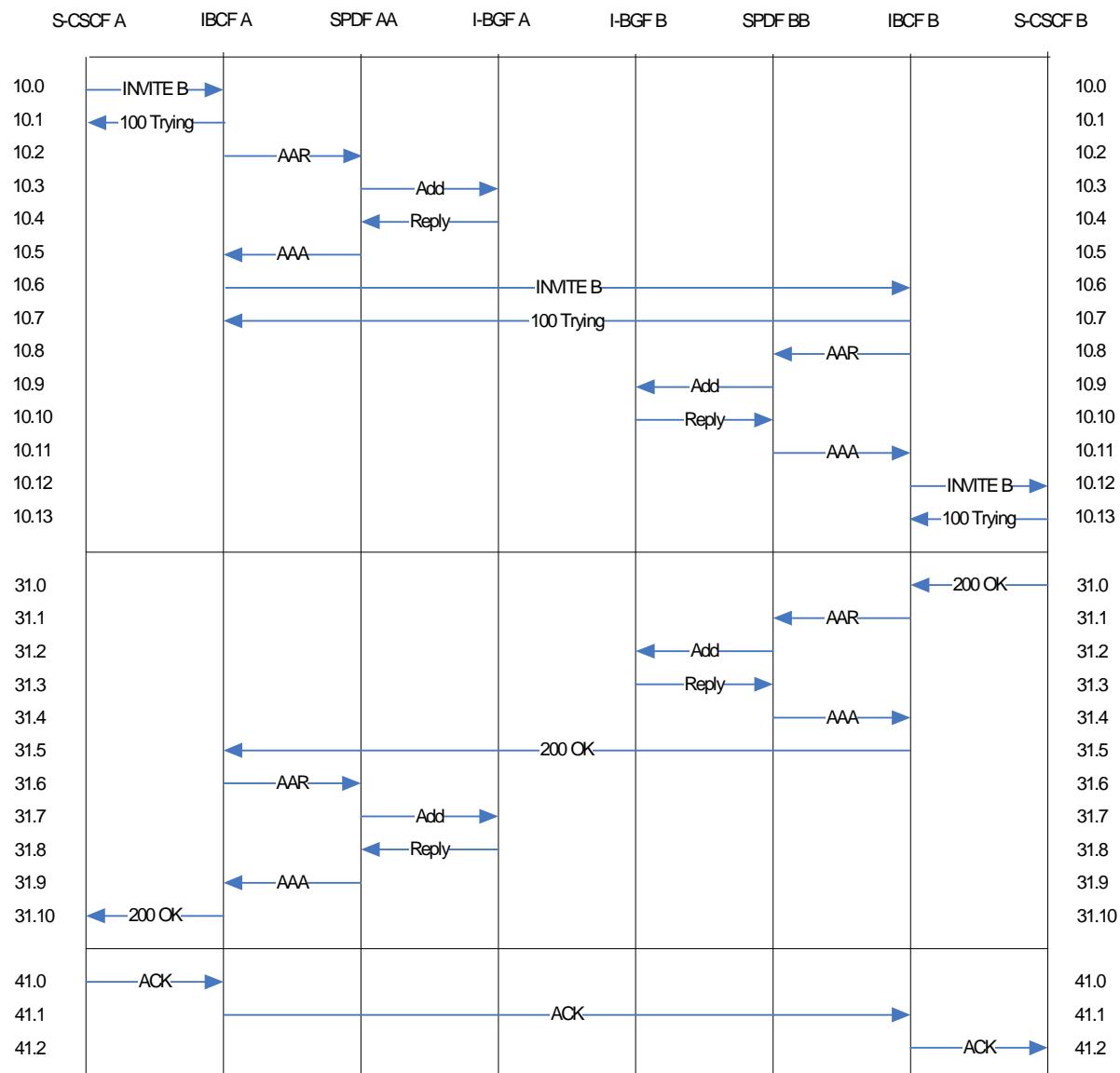


Figure 6.2.1.1: IMS end-to-end signalling chart for the IBCF - session setup

Table 6.2.1.1: IMS end-to-end messages for IBCF - session setup

Step	Protocol	Interface	From	To	Message
10.0	SIP		S-CSCF A	IBCF A	INVITE B
<pre> INVITE sip:user_b@example.com SIP/2.0 Via: SIP/2.0/UDP s-cscf-a.example.com:5060;branch=z9hG4bKpm5lmx Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 68 Record-Route: <sip:s-cscf-a.example.com;lr>,<sip:p-cscf-a.example.com;lr> From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Contact: <sip:user_a@phone-a.example.com> Content-Type: application/sdp Content-Length: 135 v=0 o=user_a 2890844526 2890842807 IN IP4 phone-a.example.com s=- c=IN IP4 10.0.0.1 </pre>					

Step	Protocol	Interface	From	To	Message
		t=0 0 m=audio 2222 RTP/AVP 0 a=sendrecv			
10.1	SIP		IBCF A	S-CSCF A	100 Trying
		SIP/2.0 100 Trying Via: SIP/2.0/UDP s-cscf-a.example.com:5060;branch=z9hG4bKpm51mx Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Content-Length: 0			
10.2	DIAMETER	Gq'	IBCF A	SPDF AA	AAR
		IBCF A uses the IP address of the SDP as the Globally-Unique-Address (i.e. the local IP address and port of the termination in C-BGF A that is associated with the IP address and port of Phone A). It is assumed that this association is statically established in C-BGF A to facilitate SIP signalling between the different address domains. It should be noted that the out direction indicates when given by an IBCF the inbound direction towards the local core network (i.e. for this message from B to A).			
		<AA-Request> ::=< Diameter Header: 265, REQ, PXY > < Session-Id = "ibcf-a.example.com;14511D;557" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "ibcf-a.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } [Media-Component-Description = { Media-Component-Number = 1 } [Media-Sub-Component = { Flow-Number = 1 } [Flow-Description = "permit out 17 from any to 10.0.0.1 2222"] [Flow-Usage = NO_INFORMATION(0)] [Max-Requested-Bandwidth-DL = 96000]] [Media-Sub-Component = { Flow-Number = 2 } [Flow-Description = "permit out 17 from any to 10.0.0.1 2223"] [Flow-Usage = RTPC (1)] [Max-Requested-Bandwidth-DL = 8000]] [AF-Application-Identifier = "GQPRIME_SAMPLE_APP"] [Media-Type = AUDIO (0)] [Flow-Status = DISABLED] [Reservation-Priority = DEFAULT (0)]] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2222 }] [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2223 }] [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] }] [Reservation-Priority = DEFAULT (0)] [Globally-Unique-Address = [Framed-IP-Address = 10.0.0.1] [Address-Realm = "example.com"]] [Authorization-Lifetime = 450]			

Step	Protocol	Interface	From	To	Message
10.3	H.248	Ia	SPDF AA	I-BGF A	Add terminations

The terminations are by default created as Inactive. Hence, the LocalControl descriptor is omitted in this message. SPDF AA defines all IP termination fields except the Id field. The Interface field is set to if1, which is at the peer core network side of I-BGF A, to define the direction at which the termination is to be created.

```
MEGACO/3 [ibcf-a.example.com]:55555
Transaction = 1 {
    Context = ${{
        Add = ip/1/if1/$ {
            Media {
                Stream = 1 {
                    Local {
                        v=0
                        m=- $ - -
                        c=IN IP4 $ 
                        b=AS:104
                    },
                    Remote {
                        v=0
                        m=- 2222 - -
                        c=IN IP4 10.0.0.1
                        b=AS:104
                    }
                } /* Stream */
            } /* Media */
        } /* Add */
        Add = ip/1/if2/$ {
            Media {
                Stream = 1 {
                    Local {
                        v=0
                        m=- $ - -
                        c=IN IP4 $ 
                        b=AS:104
                    },
                    Remote {
                        v=0
                        m=- Stream */
                } /* Media */
            } /* Add */
        } /* Context */
    } /* Transaction */
}
```

10.4	H.248	Ia	I-BGF A	SPDF AA	Reply (Add)
------	-------	----	---------	---------	-------------

```
MEGACO/3 [ibgf-a.example.com]:55555
Reply = 1 {
    Context = 1 {
        Add = ip/1/if1/1,
        Media {
            Stream = 1 {
                Local {
                    v=0
                    m=- 5554 - -
                    c=IN IP4 10.0.0.3
                    b=AS:104
                },
                Remote {
                    v=0
                    m=- 2222 - -
                    c=IN IP4 10.0.0.1
                    b=AS:104
                }
            } /* Stream */
        } /* Media */
    } /* Add */
    Add = ip/1/if2/1,
    Media {
        Stream = 1 {
            Local {
                v=0
                m=- 6666 - -
                c=IN IP4 10.0.1.1
                b=AS:104
            },
            Remote {
                v=0
                m=- Stream */
        } /* Media */
    } /* Add */
}
```

Step	Protocol	Interface	From	To	Message
					<pre> } /* Context */ } /* Reply */ </pre>
10.5	DIAMETER	Gq'	SPDF AA	IBCF A	AAA
					<pre> <AA-Answer> ::= < Diameter Header: 265, PXY > < Session-Id = "ibcf-a.example.com; 14511D;557" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "spdf-aa.example.com" } { Origin-Realm = "example.com" } [Result-Code = DIAMETER_SUCCESS (2001)] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2222 }] [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2223 }] [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }]] [Binding-Output-List = [V4-Transport-Address = { Framed-IP-Address = 10.0.1.1 } { Port-Number = 6666 }] [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.1 } { Port-Number = 6667 }] [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }]]]] [Authorization-Lifetime = 450] [Auth-Grace-Period = 10] </pre>

Step	Protocol	Interface	From	To	Message
10.7	SIP		IBCF B	IBCF A	100 Trying
<pre> SIP/2.0 100 Trying Via: SIP/2.0/UDP ibcf-a.example.com:5060;branch=z9hG4bKhfj55z Via: SIP/2.0/UDP s-cscf-a.example.com:5060;branch=z9hG4bKpm5lmx Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Content-Length: 0 </pre>					
10.8	DIAMETER	Gq'	IBCF B	SPDF BB	AAR
<p>IBCF B uses the IP address of the signalling destination as the Globally-Unique-Address (i.e. the IP address and port of the IP address and port of C-BGF B that is associated with the IP address and port of Phone B). It is assumed that this association is statically established in C-BGF B to facilitate SIP signalling between the different address domains.</p> <p>It should be noted that the "in" direction indicates when given by an IBCF the inbound direction towards the peer core network (i.e. for this message from B to A).</p> <p>The Flow-Description is given from any to any based on the decision that it is to provide addresses for the local core network and not the link between the two core networks. This decision follows the same logic as used for the access where the Flow-Description provides addresses for the access network domain only.</p> <pre> <AA-Request> ::= < Diameter Header: 265, REQ, PXY > < Session-Id = "ibcf-b.example.com;25536F;231" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "ibcf-b.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } [Media-Component-Description = { Media-Component-Number = 1 } [Media-Sub-Component = { Flow-Number = 1 } [Flow-Description = "permit in 17 from any to any"] [Flow-Usage = NO_INFORMATION(0)] [Max-Requested-Bandwidth-DL = 96000]] [Media-Sub-Component = { Flow-Number = 2 } [Flow-Description = "permit in 17 from any to any"] [Flow-Usage = RTP (1)] [Max-Requested-Bandwidth-DL = 8000]] [AF-Application-Identifier = "GQPRIME_SAMPLE_APP"] [Media-Type = AUDIO (0)] [Flow-Status = DISABLED] [Reservation-Priority = DEFAULT (0)]] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.1 } { Port-Number = 6666 }] [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.1 } { Port-Number = 6667 }] }] [Reservation-Priority = DEFAULT (0)] [Globally-Unique-Address = [Framed-IP-Address = 10.0.0.2] [Address-Realm = "example.com"]] [Authorization-Lifetime = 450] </pre>					

Step	Protocol	Interface	From	To	Message
10.9	H.248	Ia	SPDF BB	I-BGF B	Add terminations
<pre> MEGACO/3 [ibcf-b.example.com]:55555 Transaction = 1 { Context = \$ { Add = ip/1/if1/\$ { Media { Stream = 1 { Local { v=0 m=- \$ - - c=IN IP4 \$ b=AS:104 } } /* Stream */ } /* Media */ } /* Add */ Add = ip/1/if2/\$ { Media { Stream = 1 { Remote { v=0 m=- 6666 - - c=IN IP4 10.0.1.1 b=AS:104 }, Local { v=0 m=- \$ - - c=IN IP4 \$ b=AS:104 } } /* Stream */ } /* Media */ } /* Add */ } /* Context */ } /* Transaction */ </pre>					
10.10	H.248	Ia	I-BGF B	SPDF BB	Reply (Add)
<pre> MEGACO/3 [ibgf-b.example.com]:55555 Reply = 1 { Context = 1 { Add = ip/1/if1/1 Media { Stream = 1 { Local { v=0 m=- 7776 - - c=IN IP4 10.0.0.5 b=AS:104 } } /* Stream */ } /* Media */ } /* Add */ Add = ip/1/if2/1 Media { Stream = 1 { Local { v=0 m=- 8888 - - c=IN IP4 10.0.1.2 b=AS:104 }, Remote { v=0 m=audio 6666 RTP/AVP 0 c=IN IP4 10.0.1.1 b=AS:104 } } /* Stream */ } /* Media */ } /* Add */ } /* Context */ } /* Reply */ </pre>					

Step	Protocol	Interface	From	To	Message	
10.11	DIAMETER	Gq'	SPDF BB	IBCF B	AAA	
			<AA-Answer> ::= < Diameter Header: 265, PXY > < Session-Id = "ibcf-b.example.com;25536F;231" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "spdf-bb.example.com" } { Origin-Realm = "example.com" } [Result-Code = DIAMETER_SUCCESS (2001)] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.1 } { Port-Number = 6666 }] [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.1 } { Port-Number = 6667 }] [Binding-Output-List = [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.5 } { Port-Number = 7776 }] [V4-Transport-Address = { Framed-IP-Address = 0.0.0.0 } { Port-Number = 0 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.5 } { Port-Number = 7777 }]]]] [Authorization-Lifetime = 450] [Auth-Grace-Period = 10]			
10.12	SIP		IBCF B	S-CSCF B	INVITE B	
			INVITE sip:user_b@example.com SIP/2.0 Via: SIP/2.0/UDP ibcf-b.example.com:5060;branch=z9hG4bKH23gzx Via: SIP/2.0/UDP ibcf-a.example.com:5060;branch=z9hG4bKhfj55z Via: SIP/2.0/UDP s-cscf-a.example.com:5060;branch=z9hG4bKpm5lmx Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 66 Record-Route: <sip:ibcf-b.example.com;lr>,<sip:ibcf-a.example.com;lr>,<sip:s-cscf-a.example.com;lr>,<sip:p-cscf-a.example.com;lr> From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Contact: <sip:user_a@phone-a.example.com> Content-Type: application/sdp Content-Length: 125 v=0 o=user_a 2890844526 2890842807 IN IP4 phone-a.example.com s=- c=IN IP4 10.0.0.5 t=0 0 m=audio 7776 RTP/AVP 0 a=sendrecv			

Step	Protocol	Interface	From	To	Message
10.13	SIP		S-CSCF B	IBCF B	100 Trying
<pre> SIP/2.0 100 Trying Via: SIP/2.0/UDP ibcf-b.example.com:5060;branch=z9hG4bKH23gzx Via: SIP/2.0/UDP ibcf-a.example.com:5060;branch=z9hG4bKhfj55z Via: SIP/2.0/UDP s-cscf-a.example.com:5060;branch=z9hG4bKpm51mx Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Content-Length: 0 </pre>					
The above message finishes the first addition to the basic call setup signaling flow. Below follows the second addition to that signaling flow.					
31.0	SIP		S-CSCF B	IBCF B	200 OK (SDP)
<pre> SIP/2.0 200 OK Via: SIP/2.0/UDP ibcf-b.example.com:5060;branch=z9hG4bKH23gzx Via: SIP/2.0/UDP ibcf-a.example.com:5060;branch=z9hG4bKhfj55z Via: SIP/2.0/UDP s-cscf-a.example.com:5060;branch=z9hG4bKpm51mx Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 68 Record-Route: <sip:p-cscf-b.example.com;lr>,<sip:s-cscf-b.example.com;lr>,<sip:ibcf-b.example.com;lr>,<sip:ibcf-a.example.com;lr>,<sip:s-cscf-a.example.com;lr>,<sip:p-cscf-a.example.com;lr> From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 INVITE Contact: <sip:user_b@phone-b.example.com> Content-Type: application/sdp Content-Length: 126 v=0 o=user_b 29381748101 2948193018 IN IP4 phone-b.example.com s=- c=IN IP4 10.0.0.2 t=0 0 m=audio 1110 RTP/AVP 0 a=sendrecv </pre>					
31.1	DIAMETER	Gq'	IBCF B	SPDF BB	AAR (Modify)
<p>IBCF B uses the IP address of the signalling destination as the Globally-Unique-Address (i.e. the IP address and port of the IP address and port of C-BGF B that is associated with the IP address and port of Phone B).</p> <p>It should be noted that the "in" direction indicates when given by an IBCF the inbound direction towards the peer core network (i.e. for this message from B to A) and out direction indicates when given by an IBCF the inbound direction towards the local core network (i.e. for this message from A to B).</p> <p>This message contains addresses and ports for both directions in the Binding-Input-List to allow these addresses and ports to be uniquely related to the directions given in the Flow-Descriptions (i.e. although the termination for the "in" direction is already established). That is, the direction given by the first Flow-Description refers to the first V4-Transport-Address in the Binding-Input-List, the second Flow-Description gives the direction of the second V4-Transport-Address in the Binding-Input-List, and so on.</p> <pre> <AA-Request> ::= < Diameter Header: 265, REQ, PXY > < Session-Id = "ibcf-b.example.com;25536F;231" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "ibcf-b.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } [Media-Component-Description = { Media-Component-Number = 1 } [Media-Sub-Component = { Flow-Number = 1 } [Flow-Description = "permit out 17 from any to 10.0.0.2 1110"] [Flow-Usage = NO_INFORMATION(0)] [Max-Requested-Bandwidth-DL = 96000]] [Media-Sub-Component = { Flow-Number = 2 } [Flow-Description = "permit out 17 from any to 10.0.0.2 1111"] [Flow-Usage = RTPC (1)] [Max-Requested-Bandwidth-DL = 8000]]] </pre>					

Step	Protocol	Interface	From	To	Message
<pre>] [AF-Application-Identifier = "GQPRIME_SAMPLE_APP"] [Media-Type = AUDIO (0)] [Flow-Status = ENABLED] [Reservation-Priority = DEFAULT (0)]] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 10.0.0.2 } { Port-Number = 1110 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.1 } { Port-Number = 6666 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.2 } { Port-Number = 1111 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.1 } { Port-Number = 6667 }] }] [Reservation-Priority = DEFAULT (0)] [Globally-Unique-Address = [Framed-IP-Address = 10.0.0.2] [Address-Realm = "example.com"]] [Authorization-Lifetime = 450] </pre>					

31.2 H.248 |a SPDF BB |I-BGF B |Modify terminations

SPDF BB (i.e. since it is a state full MGC) knows that the termination for the "in" direction is already established and therefore issues an add message for the "out" direction only.

```

MEGACO/3 [ibcf-b.example.com]:55555
Transaction = 2 {
  Context = 1{
    Modify = ip/1/if1/1 {
      Media {
        Stream = 1 {
          LocalControl {
            Mode=SendRecv
          },
          Local {
            v=0
            m=- 7776 -
            c=IN IP4 10.0.0.5
            b=AS:104
          },
          Remote {
            v=0
            m=- 1110 -
            c=IN IP4 10.0.0.2
            b=AS:104
          }
        } /* Stream */
      } /* Media */
    } /* Modify */
    Modify = ip/1/if2/1 {
      Media {
        Stream = 1 {
          LocalControl {
            Mode=SendRecv
          },
          Local {
            v=0
            m=- 8888 -
            c=IN IP4 10.0.1.2
            b=AS:104
          },
          Remote {
            v=0
            m=- 6666 -
          }
        }
      }
    }
  }
}

```

Step	Protocol	Interface	From	To	Message
					c=IN IP4 10.0.1.1 b=AS:104 } } /* Stream */ } /* Media */ } /* Modify */ } /* Context */ } /* Transaction */
31.3	H.248	Ia	I-BGF B	SPDF BB	Reply (Modify)
					<pre> MEGACO/3 [ibgf-b.example.com]:55555 Reply = 2 { Context = 1 { Modify = ip/1/if1/1 { Media { Stream = 1 { LocalControl { Mode=SendRecv }, Local { v=0 m=- 7776 - c=IN IP4 10.0.0.5 b=AS:104 }, Remote { v=0 m=- 1110 - c=IN IP4 10.0.0.2 b=AS:104 } } /* Stream */ } /* Media */ } /* Modify */ Modify = ip/1/if2/1 { Media { Stream = 1 { LocalControl { Mode=SendRecv }, Local { v=0 m=- 8888 - c=IN IP4 10.0.1.2 b=AS:104 }, Remote { v=0 m=- 6666 - c=IN IP4 10.0.1.1 b=AS:104 } } /* Stream */ } /* Media */ } /* Modify */ } /* Context */ } /* Reply */ </pre>
31.4	DIAMETER	Gq'	SPDF BB	IBCF B	AAA
					Since SPDF BB provided Binding-Input-Lists for all addresses and ports in both directions the AAA will include this complete set of addresses and ports in the Binding-Information AVP as well.
					<pre> <AA-Answer> ::= < Diameter Header: 265, PXY > < Session-Id = "ibcf-b.example.com;25536F;231" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "spdf-bb.example.com" } { Origin-Realm = "example.com" } [Result-Code = DIAMETER_SUCCESS (2001)] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 10.0.0.2 } { Port-Number = 1110 }] [V4-Transport-Address = </pre>

Step	Protocol	Interface	From	To	Message
		<pre> { Framed-IP-Address = 10.0.1.1 } { Port-Number = 6666 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.2 } { Port-Number = 1111 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.1 } { Port-Number = 6667 }] [Binding-Output-List = [V4-Transport-Address = { Framed-IP-Address = 10.0.1.2 } { Port-Number = 8888 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.5 } { Port-Number = 7776 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.2 } { Port-Number = 8889 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.5 } { Port-Number = 7777 }]]]] [Authorization-Lifetime = 450] [Auth-Grace-Period = 10] </pre>			

31.5	SIP		IBCF B	IBCF A	200 OK (SDP)
------	-----	--	--------	--------	--------------

SIP/2.0 200 OK
Via: SIP/2.0/UDP ibcf-a.example.com:5060;branch=z9hG4bKhfj55z
Via: SIP/2.0/UDP s-cscf-a.example.com:5060;branch=z9hG4bKpm51mx
Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml
Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03
Max-Forwards: 67
Record-Route: <sip:p-cscf-b.example.com;lr>,<sip:s-cscf-b.example.com;lr>,<sip:ibcf-b.example.com;lr>,<sip:ibcf-a.example.com;lr>,<sip:s-cscf-a.example.com;lr>,<sip:p-cscf-a.example.com;lr>
From: User A <sip:user_a@example.com>;tag=372183
To: User B <sip:user_b@example.com>
Call-ID: 398174293@phone-a.example.com
CSeq: 1 INVITE
Contact: <sip:user_b@phone-b.example.com>
Content-Type: application/sdp
Content-Length: 126

v=0
o=user_b 29381748101 2948193018 IN IP4 phone-b.example.com
s=-
c=IN IP4 10.0.1.2
t=0 0
m=audio 8888 RTP/AVP 0
a=sendrecv

31.6	DIAMETER	Gq'	IBCF A	SPDF AA	AAR (Modify)
------	----------	-----	--------	---------	--------------

It should be noted that the "in" direction indicates when given by an IBCF the inbound direction towards the peer core network (i.e. for this message from A to B) and "out" direction indicates when given by an IBCF the inbound direction towards the local core network (i.e. for this message from B to A).

```

<AA-Request> ::= < Diameter Header: 265, REQ, PXY >
    < Session-Id = "ibcf-a.example.com;14511D;557" >
    { Auth-Application-Id = 16777222 (Gq) }
    { Origin-Host = "ibcf-a.example.com" }
    { Origin-Realm = "example.com" }
    { Destination-Realm = "example.com" }
    [ Media-Component-Description =
        { Media-Component-Number = 1 }
        [ Media-Sub-Component =
            { Flow-Number = 1 }
        ]
    ]

```

Step	Protocol	Interface	From	To	Message	
			[Flow-Description = "permit in 17 from any to any"] [Flow-Usage = NO_INFORMATION(0)] [Max-Requested-Bandwidth-DL = 96000]] [Media-Sub-Component = { Flow-Number = 2 } [Flow-Description = "permit in 17 from any to any"] [Flow-Usage = RTCP (1)] [Max-Requested-Bandwidth-DL = 8000]] [AF-Application-Identifier = "GQPRIME_SAMPLE_APP"] [Media-Type = AUDIO (0)] [Flow-Status = ENABLED] [Reservation-Priority = DEFAULT (0)]] [Binding-Information = { Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2222 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.2 } { Port-Number = 8888 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2223 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.2 } { Port-Number = 8887 }] }] [Reservation-Priority = DEFAULT (0)] [Globally-Unique-Address = [Framed-IP-Address = 10.0.0.1] [Address-Realm = "example.com"]] [Authorization-Lifetime = 450]			

31.7	H.248	Ia	SPDF AA	I-BGF A	Modify terminations
SPDF AA (i.e. since it is a state full MGC) knows that the termination for the "out" direction is already established and therefore issues an add message for the "in" direction only.					

```

MEGACO/3 [ibcf-b.example.com]:55555
Transaction = 2 {
    Context = 1{
        Modify = ip/1/if1/1 {
            Media {
                Stream = 1 {
                    LocalControl {
                        Mode=SendRecv
                    },
                    Local {
                        v=0
                        m=- 5554 --
                        c=IN IP4 10.0.0.3
                        b=AS:104
                    },
                    Remote {
                        v=0
                        m=- 2222 --
                        c=IN IP4 10.0.0.1
                        b=AS:104
                    }
                } /* Stream */
            } /* Media */
        } /* Modify */
        Modify = ip/1/if2/1 {
            Media {
                Stream = 1 {
                    LocalControl {
                        Mode=SendRecv
                    },

```

Step	Protocol	Interface	From	To	Message
<pre> Local { v=0 m=- 6666 - c=IN IP4 10.0.1.1 b=AS:104 }, Remote { v=0 m=- 8888 - c=IN IP4 10.0.1.2 b=AS:104 } } /* Stream */ } /* Media */ } /* Modify */ } /* Context */ } /* Transaction */ </pre>					
31.8	H.248	Ia	I-BGF A	SPDF AA	Reply (Modify)
<pre> MEGACO/3 [ibgf-b.example.com]:55555 Reply = 2 { Context = 1 { Modify = ip/1/if1/1 { Media { Stream = 1 { LocalControl { Mode=SendRecv }, Local { v=0 m=- 5554 - c=IN IP4 10.0.0.3 b=AS:104 }, Remote { v=0 m=- 2222 - c=IN IP4 10.0.0.1 b=AS:104 } } /* Stream */ } /* Media */ } /* Modify */ Modify = ip/1/if2/1 { Media { Stream = 1 { LocalControl { Mode=SendRecv }, Local { v=0 m=- 6666 - c=IN IP4 10.0.1.1 b=AS:104 }, Remote { v=0 m=- 8888 - c=IN IP4 10.0.1.2 b=AS:104 } } /* Stream */ } /* Media */ } /* Modify */ } /* Context */ } /* Reply */ </pre>					
31.9	DIAMETER	Gq'	SPDF AA	IBCF A	AAA
<pre> <AA-Answer> ::= < Diameter Header: 265, PXY > < Session-Id = "ibcf-a.example.com;14511D;557" > { Auth-Application-Id = 16777222 (Gq) } { Origin-Host = "spdf-aa.example.com" } { Origin-Realm = "example.com" } [Result-Code = DIAMETER_SUCCESS (2001)] [Binding-Information = </pre>					

Step	Protocol	Interface	From	To	Message
		<pre>{ Binding-Input-List = [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2222 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.2 } { Port-Number = 8888 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.1 } { Port-Number = 2223 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.2 } { Port-Number = 8889 }] Binding-Output-List = [V4-Transport-Address = { Framed-IP-Address = 10.0.1.1 } { Port-Number = 6666 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.3 } { Port-Number = 5554 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.1.1 } { Port-Number = 6667 }] [V4-Transport-Address = { Framed-IP-Address = 10.0.0.3 } { Port-Number = 5555 }]] } [Authorization-Lifetime = 450] [Auth-Grace-Period = 10]</pre>			

31.10	SIP		IBCF A	S-CSCF A	200 OK (SDP)
-------	-----	--	--------	----------	--------------

SIP/2.0 200 OK
 Via: SIP/2.0/UDP ibcf-a.example.com:5060;branch=z9hG4bKhfj55z
 Via: SIP/2.0/UDP s-cscf-a.example.com:5060;branch=z9hG4bKpm5lmx
 Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml
 Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03
 Max-Forwards: 66
 Record-Route: <sip:p-cscf-b.example.com;lr>,<sip:s-cscf-b.example.com;lr>,<sip:ibcf-b.example.com;lr>,<sip:ibcf-a.example.com;lr>,<sip:s-cscf-a.example.com;lr>,<sip:p-cscf-a.example.com;lr>
 From: User A <sip:user_a@example.com>;tag=372183
 To: User B <sip:user_b@example.com>
 Call-ID: 398174293@phone-a.example.com
 CSeq: 1 INVITE
 Contact: <sip:user_b@phone-b.example.com>
 Content-Type: application/sdp
 Content-Length: 126

 v=0
 o=user_b 29381748101 2948193018 IN IP4 phone-b.example.com
 s=-
 c=IN IP4 10.0.0.3
 t=0 0
 m=audio 5554 RTP/AVP 0
 a=sendrecv

The above message finishes the second addition to the basic call setup signaling flow. Below follows the third addition to that signaling flow.

41.0	SIP		S-CSCF A	IBCF A	ACK
		<pre>ACK sip:user_b@example.com SIP/2.0 Via: SIP/2.0/UDP s-cscf-a.example.com:5060;branch=z9hG4bKpm5lmx Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 68 From: User A <sip:user_a@example.com>;tag=372183</pre>			

Step	Protocol	Interface	From	To	Message
			To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 2 ACK Contact: <sip:user_a@phone-a.example.com> Content-Length: 0		
41.2	SIP		IBCF A	IBCF B	ACK
			ACK sip:user_b@example.com SIP/2.0 Via: SIP/2.0/UDP ibcf-a.example.com:5060;branch=z9hG4bKhfj55z Via: SIP/2.0/UDP s-cscf-a.example.com:5060;branch=z9hG4bKpm5lmx Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 67 From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 2 ACK Contact: <sip:user_a@phone-a.example.com> Content-Length: 0		
41.3	SIP		IBCF B	S-CSCF B	ACK
			ACK sip:user_b@example.com SIP/2.0 Via: SIP/2.0/UDP ibcf-b.example.com:5060;branch=z9hG4bKH23gzx Via: SIP/2.0/UDP ibcf-a.example.com:5060;branch=z9hG4bKhfj55z Via: SIP/2.0/UDP s-cscf-a.example.com:5060;branch=z9hG4bKpm5lmx Via: SIP/2.0/UDP p-cscf-a.example.com:5060;branch=z9hG4bKvp2yml Via: SIP/2.0/UDP phone-a.example.com:5060;branch=z9hG4bK74b03 Max-Forwards: 66 From: User A <sip:user_a@example.com>;tag=372183 To: User B <sip:user_b@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 4 UPDATE Contact: <sip:user_a@phone-a.example.com> Content-Length: 0		

6.2.2 Session termination

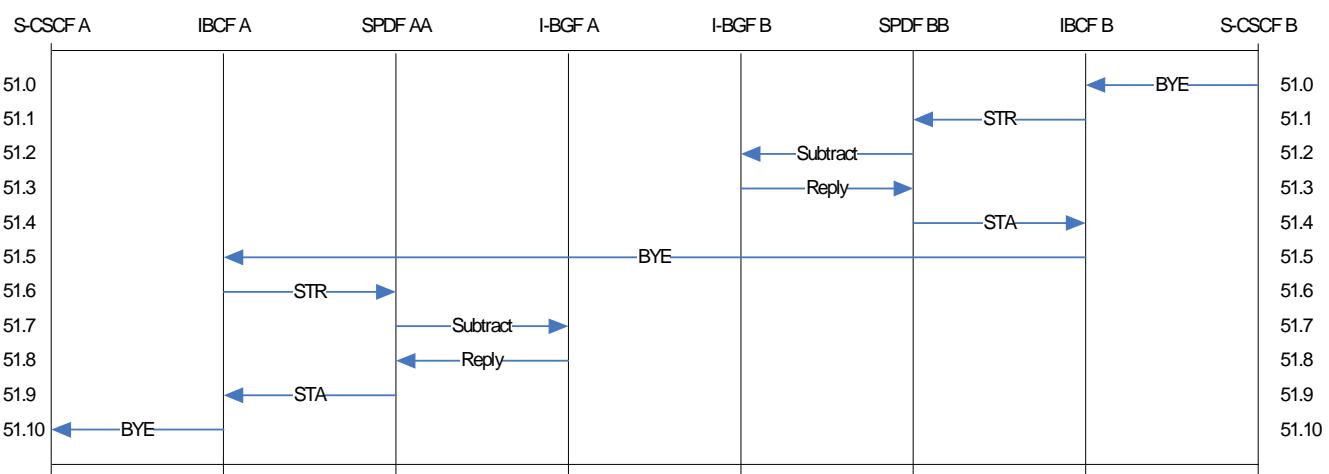


Figure 6.2.2.1: IMS end-to-end signalling chart for IBCF - session teardown

Table 6.2.2.1: IMS end-to-end messages for IBCF - session teardown

Step	Protocol	Interface	From	To	Message
51.0	SIP		S-CSCF B	IBCF B	BYE
BYE sip:user_a@example.com SIP/2.0 Via: SIP/2.0/UDP s-cscf-b.example.com:5060;branch=fg7gjH13ss8r Via: SIP/2.0/UDP p-cscf-b.example.com:5060;branch=z9hG4bKs1pp0 Via: SIP/2.0/UDP phone-b.example.com:5060;branch=z9hG4bKjwafcb9					

Step	Protocol	Interface	From	To	Message
<pre>Max-Forwards: 68 Route: <sip:ibcf-b.example.com;lr>, <sip:ibcf-a.example.com;lr>, <sip:s-cscf-a.example.com;lr>, <sip:p-cscf-a.example.com;lr> From: User B <sip:user_b@example.com>;tag=4fxdce12ls To: User A <sip:user_a@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 BYE Content-Length: 0</pre>					
51.1	DIAMETER	Gq'	IBCF B	SPDF BB	STR
<pre><ST-Request> ::= < Diameter Header: 275, REQ, PXY > < Session-Id = "ibcf-b.example.com;25536F;231" > { Origin-Host = "ibcf-b.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } { Auth-Application-Id = 16777222 (Gq) }</pre>					
51.2	H.248	Ia	SPDF BB	I-BGF B	Subtract termination BB
<pre>MEGACO/3 [ibcf-b.example.com]:55555 Transaction = 3 { Context = 1 { Subtract = ip/1/if1/1 {Audit{Statistics}} Subtract = ip/1/if2/1 {Audit{Statistics}} } /* Context */ } /* Transaction */</pre>					
51.3	H.248	Ia	I-BGF B	SPDF BB	Reply
<pre>MEGACO/3 [ibgf-b.example.com]:55555 Reply = 3 { Context = 1 { Subtract = ip/1/if1/1 { Statistics { nt/dur=450000, ; in milliseconds nt/os=5400000, ; Octets Sent nt/or=5400000, ; Octets Received gm/dp=0 ; number of packets discarded } } Subtract = ip/1/if2/1 { Statistics { nt/dur=450000, ; in milliseconds nt/os=450000, ; Octets Sent nt/or=450000, ; Octets Received gm/dp=0 ; number of packets discarded } } /* Subtract */ } /* Context */ } /* Reply */</pre>					
51.4	DIAMETER	Gq'	SPDF BB	IBCF B	STA
<pre><ST-Answer> ::= < Diameter Header: 275, PXY > < Session-Id = "ibcf-b.example.com;25536F;231" > { Origin-Host = "spdf-bb.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } { Auth-Application-Id = 16777222 (Gq) } [Result-Code = DIAMETER_SUCCESS (2001)]</pre>					
51.5	SIP		IBCF B	IBCF A	BYE
<pre>BYE sip:user_a@example.com SIP/2.0 Via: SIP/2.0/UDP ibcf-b.example.com:5060;branch=z9hG4bKH23gzx Via: SIP/2.0/UDP s-cscf-b.example.com:5060;branch=fg7gjH13ss8r Via: SIP/2.0/UDP p-cscf-b.example.com:5060;branch=z9hG4bKs1pp0 Via: SIP/2.0/UDP phone-b.example.com:5060;branch=z9hG4bKjwafcb9 Max-Forwards: 67 Route: <sip:ibcf-a.example.com;lr>, <sip:s-cscf-a.example.com;lr>, <sip:p-cscf-a.example.com;lr> From: User B <sip:user_b@example.com>;tag=4fxdce12ls To: User A <sip:user_a@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 BYE Content-Length: 0</pre>					

Step	Protocol	Interface	From	To	Message
51.6	DIAMETER	Gq'	IBCF A	SPDF AA	STR
					<ST-Request> ::= < Diameter Header: 275, REQ, PXY > < Session-Id = "ibcf-a.example.com;14511D;557" > { Origin-Host = "ibcf-a.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } { Auth-Application-Id = 16777222 (Gq) }
51.7	H.248	Ia	SPDF AA	I-BGF A	Subtract termination AA
					MEGACO/3 [ibcf-a.example.com]:55555 Transaction = 3 { Context = 1 { Subtract = ip/1/if1/1 {Audit{Statistics}}} Subtract = ip/1/if2/1 {Audit{Statistics}}} } /* Context */ } /* Transaction */
51.8	H.248	Ia	I-BGF A	SPDF AA	Reply
					MEGACO/3 [ibgf-a.example.com]:55555 Reply = 3 { Context = 1 { Subtract = ip/1/if1/1 { Statistics { nt/dur=450000, ; in milliseconds nt/os=5400000, ; Octets Sent nt/or=5400000, ; Octets Received gm/dp=0 ; number of packets discarded } } Subtract = ip/1/if2/1 { Statistics { nt/dur=450000, ; in milliseconds nt/os=450000, ; Octets Sent nt/or=450000, ; Octets Received gm/dp=0 ; number of packets discarded } } } /* Subtract */ } /* Context */ } /* Reply */
51.9	DIAMETER	Gq'	SPDF AA	IBCF A	STA
					<ST-Answer> ::= < Diameter Header: 275, PXY > < Session-Id = "ibcf-a.example.com;14511D;557" > { Origin-Host = "spdf-aa.example.com" } { Origin-Realm = "example.com" } { Destination-Realm = "example.com" } { Auth-Application-Id = 16777222 (Gq) } [Result-Code = DIAMETER_SUCCESS (2001)]
51.10	SIP		IBCF A	S-CSCF A	BYE
					BYE sip:user_a@example.com SIP/2.0 Via: SIP/2.0/UDP ibcf-a.example.com:5060;branch=z9hG4bKhfj55z Via: SIP/2.0/UDP ibcf-b.example.com:5060;branch=z9hG4bKH23gzx Via: SIP/2.0/UDP s-cscf-b.example.com:5060;branch=fg7gjH13ss8r Via: SIP/2.0/UDP p-cscf-b.example.com:5060;branch=z9hG4bKs1pp0 Via: SIP/2.0/UDP phone-b.example.com:5060;branch=z9hG4bKjwafcb9 Max-Forwards: 66 Route: <sip:s-cscf-a.example.com;lr>, <sip:p-cscf-a.example.com;lr> From: User B <sip:user_b@example.com>;tag=4fxdce12ls To: User A <sip:user_a@example.com> Call-ID: 398174293@phone-a.example.com CSeq: 1 BYE Content-Length: 0

Annex A (informative): Bibliography

- IETF RFC 2865: "Remote Authentication Dial In User Service (RADIUS)".

History

Document history		
V1.4.0	June 2008	Publication